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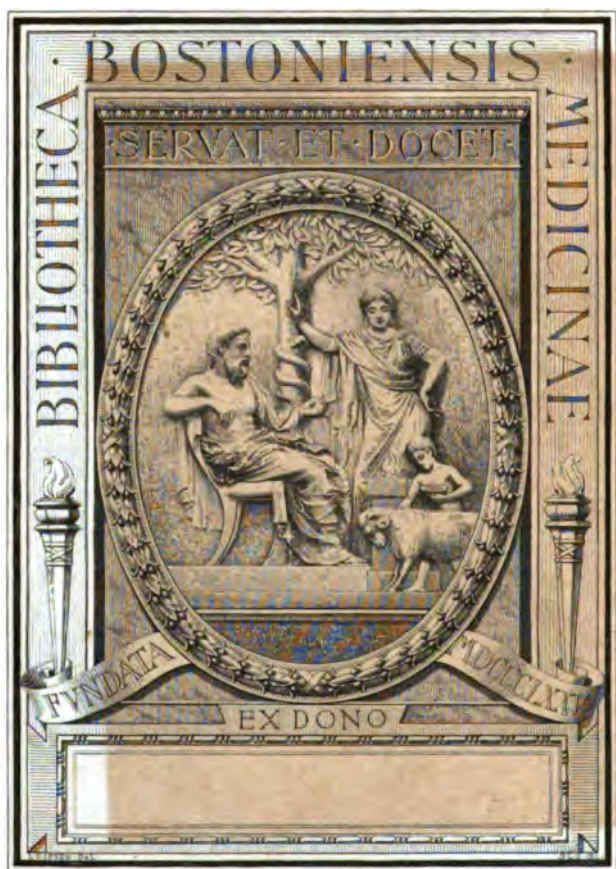
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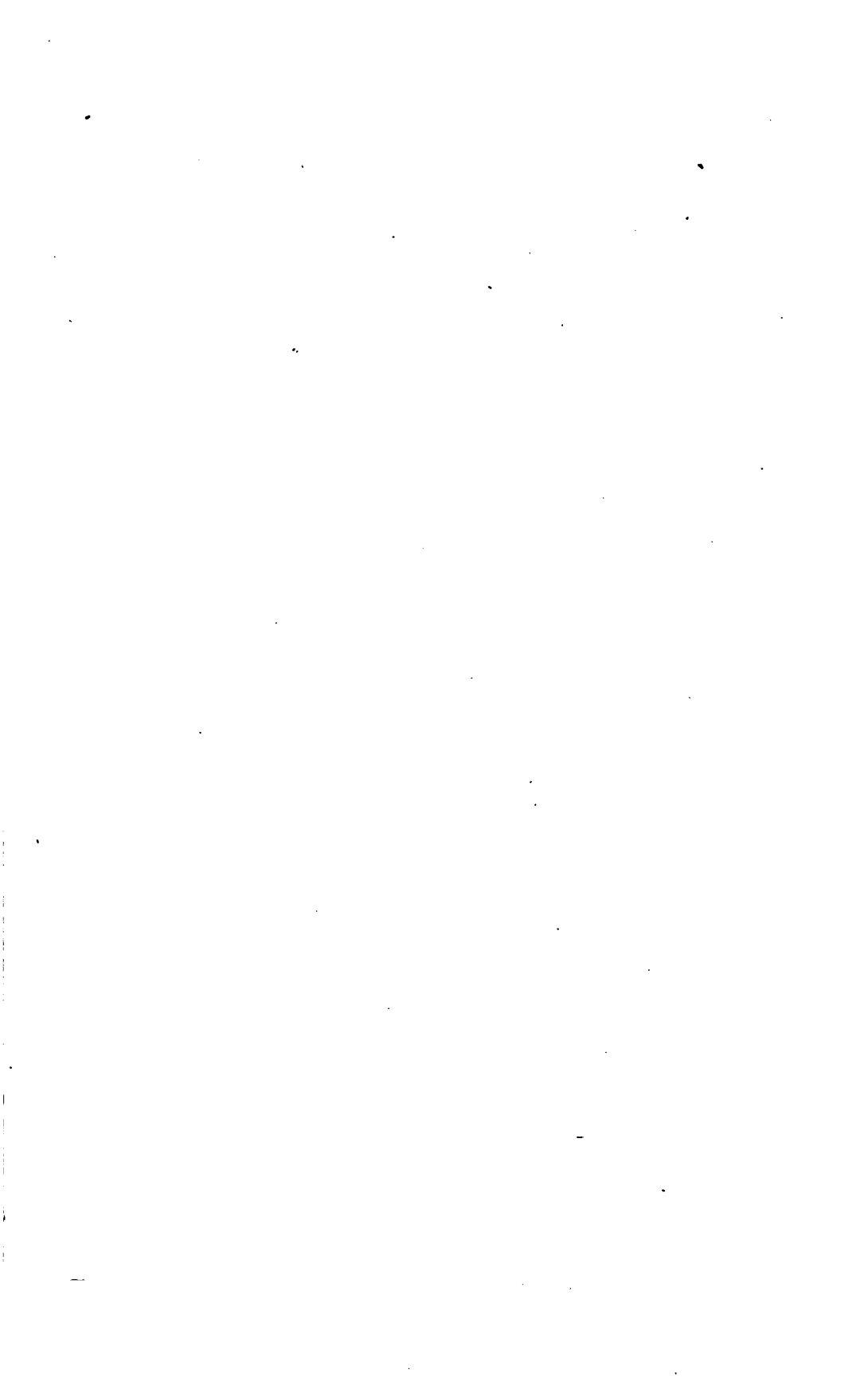
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CONTRIBUTORS TO VOLUME IV.

BELFIELD, WILLIAM T., M.D.

BLOODGOOD, JOSEPH C., M.D.

BRADFORD, JOHN ROSE, M.D., F.R.C.P.

LANDIS, H. R. M., M.D.

STEELE, J. DUTTON, M.D.

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PROGRESSIVE MEDICINE.

A QUARTERLY DIGEST OF ADVANCES, DISCOVERIES,
AND IMPROVEMENTS

IN THE

MEDICAL AND SURGICAL SCIENCES.

EDITED BY

HOBART AMORY HARE, M.D.,

PROFESSOR OF THERAPEUTICS AND MATERIA MEDICA IN THE JEFFERSON MEDICAL COLLEGE OF PHILADELPHIA; PHYSICIAN TO THE JEFFERSON MEDICAL COLLEGE HOSPITAL; ONE TIME CLINICAL PROFESSOR OF DISEASES OF CHILDREN IN THE UNIVERSITY OF PENNSYLVANIA;
MEMBER OF THE ASSOCIATION OF AMERICAN PHYSICIANS, ETC.

ASSISTED BY

H. R. M. LANDIS, M.D.,

VISITING PHYSICIAN TO THE TUBERCULOSIS DEPARTMENT OF THE PHILADELPHIA HOSPITAL,
TO THE WHITE HAVEN SANATORIUM AND TO THE PHIPPS INSTITUTE; DEMONSTRATOR
OF CLINICAL MEDICINE IN THE JEFFERSON MEDICAL COLLEGE.

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DISEASES OF THE DIGESTIVE TRACT AND ALLIED ORGANS: LIVER, PANCREAS, AND
PERITONEUM—ANÆSTHETICS, FRACTURES, DISLOCATIONS, AMPUTATIONS,
SURGERY OF THE EXTREMITIES, AND ORTHOPEDICS—GENITO-
URINARY DISEASES—DISEASES OF THE KIDNEYS—
PRACTICAL THERAPEUTIC REFERENDUM.

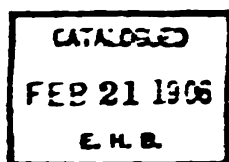


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LIST OF CONTRIBUTORS.

WILLIAM T. BELFIELD, M.D.,

Associate Professor of Surgery in the Rush Medical College; Professor of Genito-urinary and Venereal Diseases in the Chicago Polyclinic, Chicago.

JOSEPH C. BLOODGOOD, M.D.,

Associate in Surgery, Johns Hopkins University, Baltimore, Md.

JOHN ROSE BRADFORD, M.D., F.R.C.P., F.R.S.,

Professor of Medicine and Physician to the University College Hospital, London.

JOHN G. CLARK, M.D.,

Professor of Gynecology in the University of Pennsylvania, Philadelphia.

WILLIAM B. COLEY, M.D.,

Attending Surgeon to the General Memorial Hospital; Associate Surgeon to the Hospital for Ruptured and Crippled; Clinical Lecturer in Surgery and Instructor in Surgery at the College of Physicians and Surgeons, Columbia University, New York.

FLOYD M. CRANDALL, M.D.,

Adjunct Professor of Pediatrics, New York Polyclinic Hospital; Visiting Physician to the Minturn Hospital for Scarlet Fever and Diphtheria; Consulting Physician to the Infants' and Children's Hospitals, New York.

WILLIAM EWART, M.D., F.R.C.P.,

Physician to and Joint Lecturer on Medicine at St. George's Hospital, and Physician to the Belgrave Hospital for Children, London.

EDWARD MILTON FOOTE, M.D.,

Instructor in Surgery, Columbia University; Visiting Surgeon, New York City Hospital.

CHARLES H. FRAZIER, M.D.,

Professor of Clinical Surgery in the University of Pennsylvania; Surgeon to the University, Howard, and Philadelphia Hospitals.

WILLIAM S. GOTTHEIL, M.D.,

Professor of Dermatology and Syphilology, New York School of Clinical Medicine; Consulting Dermatologist to the Sheltering Guardian Orphan Asylum; Dermatologist to the Lebanon and Beth Israel Hospital, and to the German West Side Dispensary, New York.

CHARLES PREVOST GRAYSON, A.M., M.D.,

Lecturer on Laryngology and Rhinology in the Medical Department of the University of Pennsylvania; Physician-in-Charge of the Department for Diseases of the Throat and Nose in the Hospital of the University of Pennsylvania; Laryngologist and Otologist to the Philadelphia Hospital.

EDWARD JACKSON, M.D.,

Emeritus Professor of Ophthalmology in the Philadelphia Polyclinic.

H. R. M. LANDIS, M.D.,

Visiting Physician to the Tuberculosis Department of the Philadelphia Hospital, to the White Haven Sanatorium and to the Phipps Institute; Demonstrator of Clinical Medicine in the Jefferson Medical College.

RICHARD C. NORRIS, M.D.,

Assistant Professor of Obstetrics in the Medical Department of the University of Pennsylvania, Philadelphia; Physician-in-Charge of Preston Retreat.

ROBERT B. PREBLE, A.B., M.D.,

Professor of Medicine in Northwestern University Medical School; Attending Physician to Cook County, St. Luke's, Wesley, German, and Polyclinic Hospitals, etc., Chicago.

ROBERT L. RANDOLPH, M.D.,

Associate Professor of Ophthalmology and Otolaryngology in Johns Hopkins University, and Associate Ophthalmic and Aural Surgeon to Johns Hopkins Hospital, Baltimore, Md.

WILLIAM G. SPILLER, M.D.,

Professor of Neuropathology and Associate Professor of Neurology in the University of Pennsylvania; Clinical Professor of Nervous Diseases in the Woman's Medical College of Pennsylvania and in the Philadelphia Polyclinic.

J. DUTTON STEELE, M.D.,

Associate in Medicine, University of Pennsylvania.

ALFRED STENGEL, M.D.,

Professor of Clinical Medicine in the University of Pennsylvania, Philadelphia.

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PROGRESSIVE MEDICINE.

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DECEMBER, 1905.

DISEASES OF THE DIGESTIVE TRACT AND ALLIED ORGANS, THE LIVER, PANCREAS, AND PERITONEUM.

BY J. DUTTON STEELE, M.D.

THE SALIVARY GLANDS.

Parotitis as a Complication of Gastric Ulcer. This condition has had but little notice taken of it until quite recently. While quite uncommon, it is a disagreeable and serious complication of rectal feeding in gastric ulcer, and as it can be avoided by care of the mouth and proper diet it is desirable that more attention be given to it in the standard works on medicine. Soltau Fenwick and Rhodes¹ found parotitis in 2 per cent. of 153 cases of gastric ulcer admitted to the London Temperance Hospital.

Howard found 1 case of parotitis in 82 cases of ulcer from the Johns Hopkins Hospital records—1.2 per cent.

Paget reported 2 cases and Hone² collected 8 from literature and added 1 of his own.

Fenwick remarks that the occurrence of parotitis must be infinitely less common than his figures indicate, since no cases of ulcer are admitted to his wards unless they have had hæmatemesis or symptoms of perforation, conditions that greatly favor the development of inflammation of the parotid gland. In his experience the parotitis occurred only in cases of hemorrhage and curiously always upon the fourth day after the first vomiting of blood. All 3 of his patients were on rectal feeding at the time. The fever was atypical and the highest temperature came several days before there were signs of pus. All the cases suppurated and the development of the pus was very insidious. In one instance

¹ Medical Press and Circular, December 7, 1904, vol. lxxviii.

² Australasian Medical Gazette, February 18, 1898.

several free incisions were made without finding pus, although a day or so later the abscess broke into the external auditory canal. The pulse was a better indication of the onset of suppuration than the temperature. The mode of infection was evidently through Steno's duct, since it occurred only in cases in which the mouth had been neglected and was very foul. All of the cases were upon rectal feeding exclusively, and Fenwick suggests that it might be well to always allow milk and water by the mouth, with a view of preventing dryness of the oral mucous membrane, which must favor infection. The decubitus of the patient had apparently much to do in determining which gland was affected, as the dependent one was always the first attacked, and then, when the patient was forced by the pain to lie upon the other side, that parotid was affected in turn unless great care was taken. The symptoms are those of acute parotitis, namely, pain, swelling, and inability to open the mouth. In one case facial paralysis developed, which did not subside until convalescence was established.

The treatment is strict cleanliness of the mouth by frequent washing. Antiseptic mouth washes are suggested by Fenwick and Rhodes, such as a moderately strong solution of Condyl's solution, listerine 2 per cent., resorcin 10 per cent., or sulphurous acid. It may be well to stimulate the flow of saliva by asking the patient to chew a rubber ring. As parotitis is most apt to occur after hemorrhage, it is in such cases that special care should be given to the condition of the mouth. I have always found that a 1:4 solution of hydrogen peroxide is a very efficient mouth wash in such cases, and in avoiding dryness of the mouth in cases requiring rectal feeding a spray of liquid albolene or liquid vaselin has given me by far the best results. In view of the increased interest which has been recently manifested in gastric ulcer and its treatment, the chance of parotitis developing after hemorrhage and during rectal feeding should be well recognized and avoided in the manner indicated. In all 3 cases reported by Fenwick and Rhodes the mouth had been neglected and was foul.

The Saliva in Health and Disease. The increasing attention paid to the secretion of the salivary glands has developed many interesting facts which indicate that the saliva occupies a more important position in the economy of the organism than was formerly supposed. Thus its part in gastric digestion is considerable, since it has been found by the investigation of Cannon¹ that the reaction of the food in the cardiac end of the stomach remains alkaline for a sufficient time to allow the diastatic action of the saliva to convert a much greater part of the starch of the food than was formerly thought possible.

¹ PROGRESSIVE MEDICINE, December, 1904, p. 64.

Other investigations have shown that saliva, like bile, has important excretory functions and is not merely a lubricant and digestant.

Rudolf Fleckseder¹ has made a series of observations upon the chemistry of the mixed secretions as found in the mouth, as well as upon the clinical pathology of diseases of the salivary glands. He finds that usually the saliva is clearly alkaline and that the alkalinity increases with the taking of food. Sticker found, on the contrary, that the reaction might be acid in the later portion of the interval between meals, although the alkalinity was always increased after eating. Fleckseder found the reaction strongly alkaline in cases of acute uræmia, in chronic nephritis, and in gastric ulcer. An acid reaction in these conditions usually indicated the onset of some febrile complication.

In pneumonia, acute articular rheumatism, and malaria, rather curiously, the reaction was always alkaline.

In other forms of fever, especially in inflammatory conditions of the gastrointestinal tract and its appendages, such as perityphlitis, typhoid fever, and cholangitis, the saliva was often acid. The same reaction was observed in cases of severe diabetes mellitus, cancer of the stomach and other organs, severe pernicious anæmia, sometimes in chlorosis, and quite often in jaundice.

In pulmonary phthisis the early appearance of acid saliva is a bad prognostic sign in Fleckseder's experience, for in the early stages of that condition the reaction is usually alkaline. In the later stages it often becomes acid.

Fleckseder is disposed to think that in at least a part of his cases the alterations in the reaction of the saliva was connected with anomalies in the reaction of the blood. However, he is not disposed to go so far as Sticker, who explains the increased alkalinity of the saliva after meals by the increased alkalinity of the blood during hydrochloric acid secretion.

Fleckseder considers the saliva with respect to its ammonia, cyanide salts, reaction to stains, albumin, urea, sugar, acetone, and bile in cases of jaundice. He found the chlorides increased in the convalescence of acute disease, in tuberculosis, and diminished in most cases of parenchymatous nephritis.

The saliva retains its chlorides longer than the urine does in pneumonia and various conditions of inanition.

Anomalies of Secretion: Diminution in the amount of saliva (oligosialia) is usually a symptom of severe systemic disease, although a rare idiopathic form does occur, generally as one of the manifestations of neurasthenia.

¹ Zentralblatt f. innere Medizin, 1905, vol. xxvi., No. 2.

It is seen in conditions leading to loss of the body fluids, as in diabetes, polyuria, profuse diarrhoea, uncontrolled vomiting, profuse sweating, and general anasarca. Also in high-grade cachexia and anæmia, carcinoma of the stomach, cirrhosis of the liver, pernicious anæmia, in high fever, and in uræmia.

The secretion is usually concentrated, often acid in reaction and not rarely has a peculiar sweetish odor. Complete suppression follows long-continued ptyalism.

Ptyalism or Increase of Secretion. The secretion is usually thin and watery, with diminished specific gravity and solid constituents. The reaction (in Fleckseder's experience) is always strongly alkaline.

Ptyalism may arise from local causes, such as diffuse stomatitis or chronic tonsillitis. It may be a sign of early pregnancy and occasionally follows coitus and nocturnal emissions.

Intermittent or remittent increase in saliva is sometimes reflex to recurring attacks of pain, as in angina pectoris, the crises of tabes, trigeminal neuralgia, and in gastric ulcer.

THE ŒSOPHAGUS.

The Diagnosis of Carcinoma of the Œsophagus. Since the experiments of von Mikulicz have shown that it is possible to operate successfully upon the intrathoracic portion of the œsophagus the study of the diseases of this portion of the body has been given a great impetus. The invention of the œsophagoscope doubtless has had something to do with the increase in the attention paid to the gullet, and there is no doubt that the assistance it renders in diagnosis is of great value. However, it is beyond the reach of the general practitioner, who is usually dependent upon the information which is derived from the stomach tube and sound in the detection of disease in the œsophagus.

Schütz's¹ study of the diagnosis of œsophageal carcinoma is based upon 100 cases, in every one of which the diagnosis was made by the sound, although the œsophagoscope was also used in a few instances toward the end of the series. The diagnosis was confirmed in every case by the subsequent course of the disease. The seat of the cancer was in the upper third in 10 per cent., in the middle third in 33 per cent., and in the lower third in 57 per cent., which corresponds closely to the figures given by Kraus² in 857 cases. The highest point (measuring from the teeth) in Schütz's series was 18 cm., the deepest 47 cm. Usually the growth was from 38 to 42 cm. from the teeth.

¹ Zentralblatt f. die gesamte Therapie, 1904, vol. xxii. p. 225.

² Nothnagel's Hand-book.

The ages of his cases were as follows: Fifty to sixty years, 50 per cent.; sixty to seventy years, 24 per cent.; forty to fifty years, 18 per cent., with the rest scattering. The oldest was seventy-six, the youngest thirty-one years.

Schütz says that the diagnosis of œsophageal carcinoma does not always rest upon the presence of stenosis of the gullet. Carcinoma may be and very often is present without stenosis, sometimes even without much difficulty in swallowing. On the contrary, œsophagismus or spastic contraction may very closely simulate carcinoma in the difficult deglutition and the emaciation that is present.

Schütz does not recommend the use of the rubber stomach tube which is usually considered the softest and safest instrument with which to begin the examination of the œsophagus in a case of suspected carcinoma. He thinks that it is hard to overcome with it the slight spasm that is so often present in even normal gullets during the passage of the stomach tube; and since the operator is afraid to use any force at all, the tube does not reach the point of obstruction. Schütz believes that careful sounding with properly constructed bougies is safer than the use of the soft rubber tube, since the bougie is under absolute control, does not produce spasm, and is really not as dangerous as the solid and often quite sharp end of a stomach tube.

Schütz employs a bougie devised by Starck,¹ the tips of which are olive-shape, some straight, and some bent at different angles. The shaft is of rubber or silk with a steel director. The handle is marked so that the operator can tell in what direction the points of the bent tips are pointing. By studying the resistance at different points of the circumference of the œsophagus, growths can be detected which occupy only a part of the wall and do not run entirely around the circumference. The different angles of the tips enables the sound to enter strictures of which the opening is not in the centre of the tube or of which the lumen is tortuous.

The sound is inserted with the crook crosswise so as not to catch in the larynx, and then when the stricture is reached the tip is turned first in one direction and then in another until its point engages. If the growth occupies one side of the œsophagus only then the point will catch upon one side and not upon the other, and by manipulating it in different ways such a growth may be quite easily mapped out.

Symptomatology of Œsophageal Cancer. As has been said, not all of the cases of œsophageal cancer show stricture and, indeed, some of them even have no disturbance of swallowing.

Sometimes there are symptoms of stricture in the early stages that

¹ Münchener med. Wochenschrift, 1903, I., No. 4.

disappears later on, either because necrosis of the growth takes place and by the loss of tissue the obstruction is temporarily relieved, or because the obstruction is due not to the cancer itself, but to reflex spasm of the œsophagus, that undoubtedly occurs in the early stages of that disease and disappears later. However, cases have been described where stricture and interference with swallowing have been absent throughout the whole course. These have been called "latent œsophageal cancers." The absence of symptoms in such cases is often due not to any real latency, but to the fact that the growth affects only a part of the gullet wall, and the part that is not involved has the power of stretching to such an extent that the obstruction to the passage of food and liquids is not noticed, and also the ordinary straight sound following the healthy part of the wall encounters no obstruction. The bent tip of Starck's diverticulum sound would reveal the growth.

Probably another division of the cases of so-called "latent œsophageal carcinoma" is formed by malignant growth of the lower end of the tube. The old rule is that the cardia is 40 cm. from the teeth, but more recent authorities have shown that it may be 8 to 12 cm. longer. Unless this possible variation in the length of the œsophagus is kept in mind, a stricture of the gullet below the 40 cm. mark might easily be overlooked, and when the tube encounters the resistance produced by the stricture, the stoppage is thought to be caused by the entrance of the tube into the stomach.

This mistake is all the more probable because the symptoms of such cases differ decidedly from those of stricture farther up. There is distress under the lower end of the sternum and in the epigastrium and even deeper, and regular "vomiting" after eating. Schütz has repeatedly seen such cases treated for diseases of the stomach, without the passage of a tube, and even with the removal of a "test meal." The history of such cases is usually significant, because these patients invariably report that they can take fat meat better than lean, although exactly the opposite is true in most cases of true gastric disease.

Schütz has made this last observation a number of times, and is the first to put such a fact upon record. Of course, careful sounding, the recognition of the fact that the œsophagus is often longer than 40 cm., and careful examination of the supposed "stomach contents" would quickly reveal the true state of affairs.

In examining the œsophagus in cases of suspected carcinoma it must be remembered, as has been said, spasmodic strictures often occur in the early stages of cancer; so that the sound will encounter obstruction at different levels on different days. Usually this occurs above the seat of malignant disease; but Starck has reported two cases in which spasm occurred below the tumor.

Medical Treatment of Œsophageal Cancer. Schütz is strongly in favor of the systematic use of sounds in the treatment of cancer of the gullet. He has never seen harm arise from this method of treatment, and usually it is very quickly followed by increased power of swallowing, with subsequent improvement in nutrition. He does not believe in waiting until the obstruction is so great that fluids only can be swallowed, as advised by some authorities, but commences as soon as he is certain of the diagnosis. He employs Starck's diverticulum sounds and allows them to remain in the stricture for ten minutes. He uses the bougie every day at first and later every second day. In his experience there has never been a case in which the rapidity of the growth was increased or necrosis hastened by the use of the sound. Such processes are influenced more by the peculiarity of the individual case than by sounding. But when necrosis and bleeding are present to any extent the employment of the bougie is contraindicated. The best lubricant is pure olive oil. Indeed, the oil is an excellent remedy in such cases, since it usually passes the stricture with comparative ease, helps nutrition, and, if taken just before the sound is used, lubricates its passage.

Rectal feeding is occasionally used by Schütz to help nutrition, but he never employs it as the only means of feeding the patient.

In dilatation of the Œsophagus above a stricture food and mucus often accumulate and, fermenting, produce irritation and much discomfort. This can be relieved by washing out the Œsophageal sac with an ordinary stomach tube. Systematic sounding is the best means of relieving the stagnation, by increasing the lumen of the tube, but while this is being done lavage of the gullet adds greatly to the patient's comfort.

Olive oil in many cases seems to relieve irritation and passes the stricture easier than any other food. In general, oils and fat can be more comfortably swallowed and are of value in increasing nutrition.

In cases in which there is much pain, morphine is sometimes needed, and belladonna is occasionally of service in relieving spasm.

Rosenheim employs a 3 per cent. eucaïne spray applied directly to the stricture by a rubber tube, through which a spray is thrown, when the pain is persistent.

The operative measures to be considered are: resection, external Œsophagotomy with the establishment of a fistula in cases in which the obstruction is high up, and gastrotomy followed by retrograde sounding in low strictures.

Kraus¹ states that the period of life is certainly no longer in operative cases than when the disease is treated by systematic sounding. Besides, the discomfort of the patient is much increased by operation. Therefore,

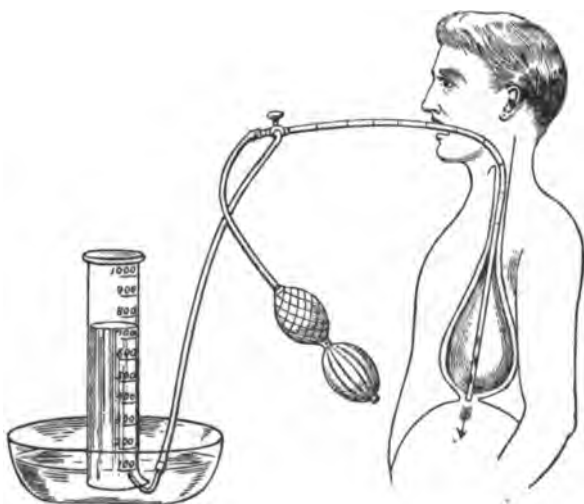
¹ Nothnagel's Handbuch, Bd. xvi., part i.

we would be warranted in regarding operation as a last resort and only to be advised when the stricture becomes impervious to fluids.

Exner¹ reports a series of cases in which the use of radium appeared to hasten necrosis and relieved obstruction.

Diagnosis of Cardiospastic Dilatation of the Œsophagus. Strauss² has improved the apparatus that he devised for this purpose and which he described three years ago.³ It consists in the modified form of a sound which is widened at its lower end so as to make a sort of a balloon. The lower end of the tube is inserted into the stomach, which can be done more readily by gently inflating the œsophagus. The entrance of the tip of the tube into the stomach can be determined by listening for the blowing sound of the entrance of air into the stomach and by the fact that pressure upon the epigastrium will displace water in a jar connected with the sound (Fig. 1). The capacity of the dilatation can

FIG. 1



Apparatus devised by Strauss for the estimation of the capacity of œsophageal dilatation and to differentiate simple dilatation from diverticula.

be measured by determining the amount of air required to fill the balloon. The pressure exerted by a deep inspiration will empty the balloon and facilitate the withdrawal. The diagnosis between a fusiform dilatation and a diverticulum is made by noting whether the tube passes directly from a dilatation of the œsophagus into the stomach or whether it has to be withdrawn a certain distance first before it will pass the cardia.

¹ Wiener klin. Wochenschrift, 1904, li., No. 4.

² Berliner klin. Wochenschrift, 1904, xli., No. 48.

³ Ibid., 1902, xxxix., No. 14.

The latter alternative always indicates a diverticulum. Strauss reports the case of a man, aged thirty years, who had presented symptoms of cardiospasm for ten years. At first there were slight attacks of difficulty in swallowing. These grew more severe in degree. Then he could only swallow when he washed the food down with liquid and had a feeling as if the food remained in the stomach.

He complained during this period of headache and general ill-being, but never of vomiting. After he had suffered in this way for four years he began to vomit, usually about an hour after eating, and especially upon exertion. He could swallow food only when he sat or stood up and never when he was recumbent.

The patient learned by experience that vomiting brought him relief, and he often resorted to it voluntarily.

The stomach tube introduced into the œsophagus showed evidences of stagnation and brought up a mixture of undigested food and mucus which was acid, apparently from the presence of lactic acid. It contained no free HCl and no pepsin. After gently inflating the œsophagus the tube was passed into the stomach, which it entered directly and not after being withdrawn first, indicating a fusiform enlargement and not a diverticulum. Stomach contents were withdrawn, containing no free HCl, but with a good amount of pepsin.

Strauss measured the capacity of the dilatation by inflation of the bag and found it to be about 350 c.c.

The patient was put upon rectal feeding with good amounts of oil, butter and milk by the mouth, with a teaspoonful of tannin four times daily. After three weeks the general condition of the man had greatly improved and he had gained nine pounds. Then the œsophagus was washed out with fresh water followed by silver nitrate solution, and the mouth feeding was increased. Six weeks after treatment was commenced there had been a gain of twenty-one pounds, the patient was free from pain, and the œsophageal contents no longer contained mucus, indicating a subsidence of the œsophagitis in the dilatation. Systematic dilatation of the cardia was then commenced, and this was kept up at intervals for several months.

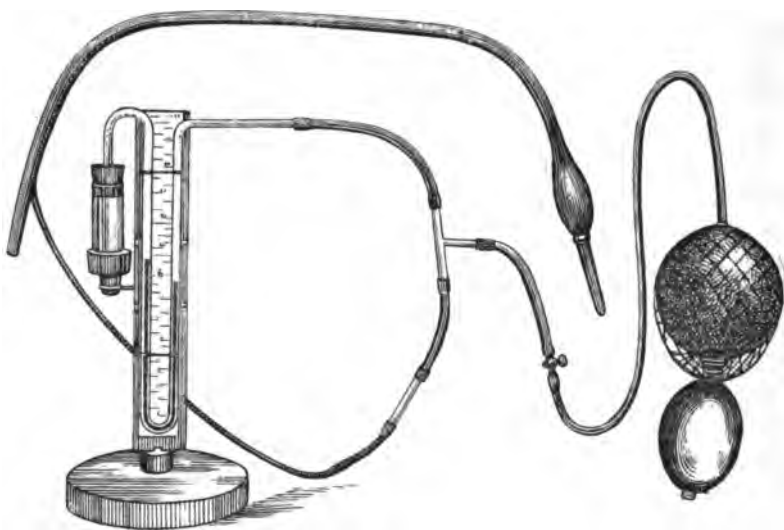
Nine months later the patient was entirely free from symptoms and had gained twenty-eight pounds. However, examination showed that the œsophagus was still dilated, with a capacity of 420 c.c.

THE TREATMENT OF CARDIOSPASM BY DILATATION. In Strauss' methods all of the instruments employed are soft and flexible. One is a soft rubber, perforated sound with a hollow metal spiral guide ending 2 cm. from the tip. With this apparatus the œsophagus is gently inflated as the tube was introduced, favoring the entrance of the tip into the stomach. After this has been used for some time he employs another

instrument which has a spindle-shaped balloon on the tube (Fig. 2). This is inserted with gentle inflation until it is shown to be in the stomach, by hearing the murmur of the air passing into the bag while in that organ.

When the bag has passed into the stomach it is inflated with a known amount of air to such a degree that its circumference is about 9.5 cm. Gentle traction brings the bag back through the cardia and accomplishes the dilatation. The pressure is regulated by a mercurial manometer, as is shown in the illustration, and should not exceed 250 mm. In Strauss' instrument the mercury escapes at that point. Dilatation should

FIG. 2



Apparatus devised by Strauss for the treatment of cardiospasm by dilatation.

not be begun until all signs of inflammation of the œsophagus above the cardia have subsided. This is favored by gentle lavage of the gullet, rectal feeding, and a diet of milk and fats. The patient will usually not be ready for the systematic use of the sound for six weeks.

Radium in Diagnosis and Treatment. Einhorn¹ has employed a radium diaphane to illuminate the œsophagus, lungs, stomach, and bowel. He finds the method best suited for gastric diagnosis. The sides and back of the stomach can be quite easily penetrated by the rays.

A case of tumor of the stomach gave a shadow picture determining its outline.

Therapeutically, Einhorn has employed radium in *œsophageal carcinoma* (in 9 cases) and has observed some benefit from its use. No cures resulted, but a temporary widening of the stricture was obtained.

¹ Medical Record, July 30, 1904.

Œsophageal Rupture and Œsophageal Mylacia. Since Boerhaave first described the rupture of the Œsophagus in an apparently healthy individual twenty-five cases in all of this condition have appeared in medical literature. The clinical picture is a remarkably constant one. The cases are almost always men, generally alcoholics, and the rupture usually follows violent and continued vomiting, although one case occurred during difficult defecation. The symptoms are severe pain in the breast, rapidly developing dyspnœa, and subcutaneous emphysema, and, after a time, vomiting of blood.

The pathological findings are also remarkably alike in all the cases, namely, a longitudinal rupture of the Œsophageal mucous membrane, sometimes reaching into the stomach, but generally stopping at the cardia. The rupture occurs oftenest in the posterior or lateral portions of the tube, rarely in the anterior. The muscularis is sharply torn as well and communication is established with the mediastinum and left pleura, rarely with the right. There are stomach contents in the pleural cavity, more or less congestion of the lungs, interstitial emphysema, and blood clots in the lumen of the gastrointestinal tract. Great doubt has been expressed as to whether the rupture ever occurs in a perfectly normal Œsophagus, and it is believed that there is not always some softening process present when the force is exerted.

Beneke¹ has satisfied himself by his examination of the Œsophagus from the case reported by Leyden, which specimen is still in the museum at Königsberg, that this case at all events is a pure example of spontaneous rupture of an entirely normal Œsophagus. In most of the other cases reported it seems certain that no previous disease of the Œsophagus existed. Indeed, Beneke has proven experimentally to his own satisfaction that no great amount of force is needed to rupture the Œsophagus, if the pressure is applied suddenly and not slowly, as in most previous experiments. So there is really no need to seek for any other cause than violence for such cases of spontaneous rupture. There is, however, a form of spontaneous rupture accompanied by Œsophageal softening which occurs in the agonal stage of various diseases, especially of the central nervous system. This variety is of great interest not only clinically as explaining the mode of death, but physiologically as well, since it is probably an instance of autodigestion. The problem in such cases is to determine whether or not the process is *intra vitam* or *postmortem*. Beneke examined eleven cases of spontaneous rupture in cases of meningitis and found that microscopic examination of the tear in the Œsophagus showed round-cell infiltration around its edges, proving satisfactorily that the rupture had occurred before death.

¹ Deutsche med. Wochen., 1904, vol. xxx., No. 41.

A number of such cases of agonal rupture have been reported, one of them by Beneke, but in the absence of microscopic examination of the tear it is impossible to tell whether or not they were *intra vitam*, though the chances are in favor of their so being.

One important clinical method of investigation was neglected in all of them. The signs of hydropneumothorax were present during life, and autopsy showed air and fluid in the pleural cavities. However, no puncture was made before death, and we cannot be certain what the original nature of the fluid was. If it had been shown to be stomach contents, it would have been proved past a doubt that the œsophageal rupture was *antemortem*. As this was not done, it is uncertain whether or not the fluid was a rapidly forming effusion. The needle should be used to settle this point in all future cases.

The mechanism of *antemortem* softening and rupture is best explained as follows:

The very much weakened patient vomits and, on account of the recumbent position, and probably always because there is some narrowing of the upper œsophagus, such as would be caused by an enlarged thyroid or bronchial gland, a certain amount of gastric contents remain in the œsophagus. The lowered vitality of the tissues favors autodigestion and softening, and finally renewed vomiting resisted by the narrowing, if that is present, produces the rupture.

The theory of Zenkers and Brosch that there must be some vascular spasm in the œsophageal mucous membrane producing a local anæmia before autodigestion can take place is not capable of demonstration, and, indeed, unnecessary. Beneke has proven by experiments upon dogs that autodigestion occurs when gastric contents are retained for a period of four hours in the œsophagus.

The whole question is important and interesting perhaps more from a pathological than from a therapeutic standpoint.

THE STOMACH.

Gastric and Intestinal Crises. Gastric crises are only occasionally associated with primary stomach affections and are much more frequently reflex symptoms of organic disease in other parts of the body.

By far the most important cause of such attacks is sclerosis of the posterior columns (*tabes dorsalis*) and a very interesting and important fact is that the attack usually occurs in the early stages of *tabes* before the classical symptoms of that disease have developed.

Ewald¹ has observed 50 cases of typical gastric crises during the past

¹ Zentralblatt f. die gesamte Therapie, 1904, Bd. xxii. p. 505.

year and bases upon their study a summary of the symptomatology and treatment of the condition.

Syphilis was undoubted in 16 of 26 cases, was denied by the patient in 7, and was doubtful in 3. So 62 per cent. of the cases of gastric crises had a syphilitic history—a point that is of value in the differential diagnosis. The attacks of gastric distress always came in shortening intervals. At first they were sometimes one and one-half years apart; then one year, then six months, and then only fourteen days. Finally, they recur every other day or so.

Each attack tends to become longer with each recurrence, lasting at first thirty minutes and finally running over twenty-four or even forty-eight hours. Sometimes the crises are so close together that practically one attack lasts two or three weeks. The character of the crisis also varies. Usually it is ushered in by cramps in the epigastrium and over the stomach, accompanied at first by slight nausea, later by vomiting that is very excessive and extraordinarily painful. The vomitus at first consists of particles of food, then of mucus and bile, and finally may be streaked with blood. Vomitus of pure blood (Charcot's black vomit) is rare, but Ewald has seen it in 4 cases, twice associated with melæna.

Usually the attack comes on like lightning and leaves as quickly, so that the patient, who has been doubled up with pain one moment, the next sits up in bed and demands food.

In other cases the onset of the crisis is slower and the after-effects are more disagreeable. Ewald has observed a sort of aura which consists of pains in the breast and back, and a sensation of constriction and depression.

The pain, as a rule, is very severe and almost unbearable, but was entirely absent in 2 of Ewald's cases in which the only symptom was vomiting and vertigo. In 1 case deep stupor accompanied the attack. This patient had also a well-marked gastric dilatation as a constant condition. The severity of the attacks varies considerably even in the same individual, and mild crises may alternate with very severe ones. It is surprising for how long a period these crises may antedate the onset of the first typical symptoms of tabes. One of Ewald's cases was under observation for five years and had five attacks before the first sign of spinal disease developed. In another the period was ten years.

The attacks usually diminish in intensity with the onset of true tabes. Still, cases do occur in which the crises grow more severe instead of lessening and then form a very serious complication of the primary disease.

Gastric secretion as shown by a test meal is usually not much affected, but when any modification does occur hydrochloric acid is oftener

increased than decreased. Usually there are no disturbances of the function of the gastrointestinal tract in the intervals between the attacks, though Ewald has seen diarrhoea after the crises in two cases. There is no change in the urine.

Another form of the condition is characterized by cramp-like contractions of the abdominal muscles instead of gastric pain, especially of the hypogastrium, which is accompanied by the most intense cramp-like and tearing pains. The abdomen is board-like and often scaphoid. In many cases knots of intestines can be felt in the ileocaecal fossa or over the pubis which relax with a bubbling murmur. Such attacks seldom last longer than a few moments and often recur several times in one day, apparently with some periodicity. In the interval the abdomen is normal.

Intestinal and rectal crises may also occur that correspond in a general way to gastric crises, except that they come later in the course of the disease after well-marked tabetic symptoms have developed. They are sudden in onset and subsidence and are characterized by intense burning and boring pain in the intestines or rectum. As a rule, patients that have gastric crises do not have the intestinal or anal form and *vice versa*.

The diagnosis of these gastric and abdominal crises due to tabes is a matter of great difficulty and of equally great practical clinical importance. They can be very easily confused with other conditions producing paroxysmal gastric pain and vomiting, among which are lead colic, severe morphinism, pregnancy, pain due to hepatic or renal colic or vesical calculus, malaria and various intestinal and uterine diseases. Mistakes in diagnosis are only too common and Ewald refers to a case in which he has made the diagnosis of tabetic crises. A surgeon later pronounced it a case of gallstones, operated, and found nothing.

Still more instructive is a case reported by Werner.¹ A woman had suffered for three years with paroxysms of the type of gastric crises. First a diagnosis of pregnancy was made and the cervix was dilated without finding a foetus and with no benefit to the attacks. Then the symptoms led to a diagnosis of gastric dilatation from gastric ulcer and pylorospasm and a gastroenterostomy was done. Then the attacks were thought to be reflex from ovarian trouble and both ovaries were removed. Finally all the symptoms of a true tabes developed four years after the attacks commenced. The patient died in a short time of phthisis and the autopsy revealed a typical tabes dorsalis.

The differential diagnosis is most difficult because, as has been said, these crises may appear before any of the classical symptoms of tabes.

¹ Inaug. Diss., Berlin, 1889.

The main-points by which we can hope to recognize the true source of the disease are: the development of the attacks, which occur at long intervals at first and gradually grow more frequent; a history of syphilis in more than half the cases; the character of the paroxysms, which are abrupt in onset, with boring and tearing pains, associated with vomiting, although in some cases either the vomiting or the pain may be absent.

The diagnosis is often difficult between these crises and those of somewhat similar nature that occur in other diseases of the central nervous system, such as general spinal paralysis, multiple sclerosis, and compression of the cervical cord. In crises due to these later conditions the characteristic symptoms of the primary disease are usually well developed when the attacks occur, while in tabetic crises this is not the case.

The condition most closely simulating tabetic crises is the form of periodic nervous vomiting without organic lesion described by Leyden and Boas. The points of difference are: (1) The periodicity of the functional vomiting, which usually occur near menstruation and especially in the spring and fall and in young women. The patient in such cases is almost always anæmic and pale, with poor appetite, coated tongue, etc. (2) There are absolutely no signs of spinal disease and none develop, but there are signs of neurasthenia and hysteria. (3) The attacks usually occur after eating. (4) The functional vomiting improves under treatment, while the tabetic crises do not.

The *treatment* of tabetic gastric crises is unsuccessful and unsatisfactory. Ewald has tried a large number of remedies and measures directed against the gastric attacks and also against the primary disease without success. This includes suspension, mercury, silver nitrate, antipyrin, and cerium oxalate.

In severe cases morphine cannot be dispensed with. It is best given in small doses at first, which must be increased in severe cases or in those of unusual length. Sometimes in an unusual patient we may find that a dose of morphine is required far above the maximum, which reveals the opium eater. As in all recurring paroxysms, the habit is unfortunately too easily acquired, and it is safest for the physician to keep its administration in his own hands. The injection of anæsthetics into the spinal canal has been advised and practised by Chatelin,¹ who injects a solution of cocaine under the dura of the cord in the sacral region. Ewald has used the method in many cases and finds it very simple and without bad results, but is not sure that it benefited the attacks of gastric pain.

¹ Annales des maladies des organes genito-urinaires, April, 1903.

The treatment of periodic idiopathic vomiting which is dependent upon functional neuroses is much more satisfactory. Here tonics, hygienic and dietetic measures, with iron and arsenic, usually give relief in time. Local treatment by washing out the stomach with chloroform-water or solutions of argentic nitrate is often of benefit. During the attacks various sedatives are indicated, such as the bromides, hyoscyamus, or orthoform. Some cases of idiopathic vomiting are very obstinate, and patients that are greatly run down may resist treatment for a long time.

The response to proper measures, slow as it sometimes is, may be the only means of distinguishing these cases of idiopathic vomiting from tabetic crises.

Arteriosclerotic Abdominal Pain. Max Buch,¹ from a study of 25 cases collected from literature and from his own experience, has drawn the clinical picture of pain arising in cases of splanchnic arteriosclerosis. The significance of this symptom-complex has not been recognized until within the past few years, and yet arteriosclerotic pain is probably comparatively common and is a more frequent cause for paroxysms of epigastric pain in elderly people who have arteriosclerosis than is organic disease of the gastrointestinal tract itself. Sclerosis of the arteries of the brain, kidney, heart, and extremities have each their own well-known set of painful symptoms, but our knowledge of the paroxysm arising from abdominal atheroma has been very confused, and this work by Buch puts the subject in a much clearer light. Paroxysms of abdominal pain were the essential characteristics of all the cases tabulated, but Buch divides the condition into two varieties, depending upon the relation of heart symptoms to the abdominal ones.

Arteriosclerotic Cramp. In this form there is severe abdominal cramp occurring paroxysmally in persons past forty years of age. It is generally localized just above the navel, rarely just below it. The paroxysms resemble the text-book pictures of gastralgia, except in the conditions which determine the attack. The pain may last only a very few minutes, less often a half-hour or more. The tendency is to recur frequently, often many times in a day. The paroxysms are brought on by circumstances that indicate their arteriosclerotic origin and that are strikingly similar to those introducing attacks of angina. Almost every attack may be traced either to overexertion, emotional disturbances, or to assuming the horizontal position. Walking or going up and down stairs are frequent causes and one-fifth of all the paroxysms in the tables were induced by lying down. Attacks of true angina pectoris sometimes

¹ St. Petersburger med. Woch., 1904, vol. xxix., No. 27, and Archiv f. Verdauungs-krankheiten, 1904, vol. x., No. 6.

occurred between the crises of abdominal pain, but in this form of the disease cardiac and abdominal pain do not occur together. In almost all the cases there was a general peripheral arteriosclerosis and accentuation of the second aortic sound. No studies in blood pressure were made. The abdominal aorta was never dilated or misplaced, but it was almost always tender, and this sensitiveness was quite as marked over the larger branches as over the aorta itself. The point of tenderness in Buch's own cases generally corresponded to the seat of spontaneous pain; 14 of the 25 collected cases belonged to the above class of simple abdominal cramp; 7 of these were under Buch's own personal observation. He found that diuretin, 3 or 4 gm. (45 to 60 gr.) daily, and strophanthus, 15 to 24 drops daily, acted almost as a specific—so much so that he advises the use of these two remedies as aids in diagnosis.

In the second class of cases the epigastralgia was one of the manifestations of a true angina pectoris or anginoid attack. The occurrence of abdominal pain in certain forms of angina pectoris is a well-recognized phenomenon and has been described by v. Schrötter and Huchard. The epigastric pain may initiate the attack or the pain may radiate there from the præcordium or, finally, there may be no heart pain at all and the cardiac origin of the epigastralgia is indicated by arrhythmia, slowing of the pulse, and even neuralgic pain in the head, shoulders, and arm similar to the radiation of a typical angina. In this group of cases the general health and the condition of the circulation was not as good as in the other form, and cedema, abdominal effusion, and other signs of failure of the cardiac muscle were almost always present in the cases under Buch's own observation. Buch has the same confidence in strophanthus and diuretin here as in the simple sclerotic cramp. Usually there is no disturbance of digestion, and the taking of food bears no relation to the onset of the pain except that too large a meal may precede an attack. Several cases of arteriosclerotic cramp in which a diagnosis of gastric ulcer was made have been reported. The differential diagnosis in such cases would rest upon the absence of pain after an ordinary meal, which is present in arteriosclerotic pain and is absent in ulcer. The fact must not be overlooked, however, that splanchnic arteriosclerosis may be a cause of gastric ulcer. In the two or three examinations of stomach contents made the results were inconstant, there being sometimes a hyperacidity, sometimes a subacidity. There was usually no disturbance of motility. To epitomize: Arteriosclerotic pain is probably a frequent affection. Attacks of epigastralgia in elderly persons are caused probably more often by splanchnic arteriosclerosis than by organic disease of the gastrointestinal tract. The diagnostic points are the fact that the pain is brought on by exertion, emotion, and assuming the horizontal position and not by food, and,

if we accept Buch's statement, the fact that arteriosclerotic pain is invariably relieved by diuretin and strophanthus.

Buch thinks that the source of the pain is neuralgia of the abdominal sympathetic.

Advances in the Chemistry of Digestion. ANTIENTZYMES. The enzymes or soluble ferments occupy perhaps the most important place in the investigations into the chemistry of the gastrointestinal tract in recent times. Much has yet to be learned of their physical and chemical properties, but many facts about them are of very great interest and point toward still more important and practical discoveries in the future.

It seems probable that these soluble ferments are specific in their action and that antienzymes exist capable of resisting their action. Thus, Weinland,¹ in studying the nature of the resistance which intestinal parasites offer to the digestive juices in which they exist, has come to the conclusion that the parasites elaborate specific substances which inhibit the action of pepsin and trypsin or, in other words, antienzymes.

Proceeding along the lines of investigation suggested by this discovery, Weinland found that extracts of the stomach and pancreas, like extracts of intestinal parasites, have the power of checking the proteolytic power of pepsin and trypsin in tests outside the body. The inference is that such antienzymes have the power of protecting the body against its own digestive juices and prevents autodigestion.

We can only surmise the bearing of this discovery upon the pathology of the gastrointestinal tract, but many interesting possibilities are suggested.

For instance, if these antienzymes are absent in a certain area of the gastric mucous membrane from some pathological process that we do not yet understand, would not autodigestion take place with the formation of a gastric ulcer?

A SPECIFIC GASTROTOXIN. In an attempt to investigate the pathology of gastric ulcer Charles Bolton,² research scholar of the Grocers' Company of London, has apparently demonstrated the formation of a gastric toxin in blood serum by subcutaneous injections into one animal of an extract of the gastric mucous membrane of another animal.

The injected animals always showed symptoms of depression and shock, but recovered unless the dose was a large one or bacterial infection took place. After a short time a toxic substance appeared in their blood that had an affinity for the mucous membrane of the stomach where it produced necrosis with hemorrhage. It is possible that the presence

¹ Zeitschrift f. Biologie, 1902, Bd. xlv. p. 1.

² Proceedings of the Royal Society of London, 1905, vol. lxxiv., pp. 135-147.

of some such specific toxin in the blood of human beings may determine the formation of gastric ulcer.

This toxin might be formed by the absorption of its own cells or, what appears much more likely, the absence of some antibody that normally controls such processes.

Serum Diagnosis of Carcinoma of the Stomach. The experiments to develop an accurate method are as yet not wholly satisfactory. The test is briefly as follows: The washings of the stomach containing albumin from a case of carcinoma ventriculi is obtained after the method of Salomon.¹

Rabbits are injected twice a week with 10 to 15 c.c. of this washing, ten or eleven injections being given in all. The resulting immune serum is then treated with small amounts of a solution of human blood. A slight precipitate is formed, which is removed by centrifugation.

This clear, immune rabbit serum is treated with the stomach washings to be examined obtained by Salomon's method. A precipitate indicates cancer of the stomach, and if it does not form then the washings are not from a carcinomatous stomach. If this method proves accurate it is a very valuable addition to our methods of diagnosis. It would differentiate ulcer from carcinoma which Salomon's method does not do, and would be an ideal test to distinguish simple ulcer from carcinomatous ulcer. I cannot see how it can prove of value in the early diagnosis of cancer of the stomach, for the washings do not bring away albumin unless the carcinoma has ulcerated, which infers a comparatively late stage of the process. However, it may be possible to remove this objection by obtaining the serum to be tested by some other method.

Increased Nitrogen and Albumin in Stomach Washings and its Clinical Significance. The method devised by Salomon for the diagnosis of carcinoma of the stomach by estimating the albumin and nitrogen in the washings from the empty stomach was described in *PROGRESSIVE MEDICINE* December, 1904.

Berent and Gutmann² have confirmed these observations in a series of 32 cases of various gastric lesions in which the test was applied. Their list included 8 cases of cancer in which the diagnosis was confirmed by operation or autopsy or by the subsequent course of the case. Washing the empty and clean stomach with normal salt solution showed a nitrogen content in the wash-water of 84 to 79 mg. of nitrogen in 100 c.c. of wash-water and three-fourths per cent. of albumin by Esbach's method. One of 6 cases of gastric ulcer showed the same increase in nitrogen and albumin, but in no other disease of the stomach could

¹ *PROGRESSIVE MEDICINE*, December, 1904, p. 46.

² *Deutsche med. Wochenschrift*, 1904, xxx., No. 28.

albumin be found in the wash-water. The fact that even one case of gastric ulcer gave an amount of albumin and nitrogen equal to that obtained in carcinoma renders Salomon's test of no value in the differential diagnosis between simple ulcer and carcinoma, and so the method will not show whether an ulcer is undergoing carcinomatous change. The presence of albumin in the wash-water depends upon ulceration, and so the test will not show the presence of a diffuse and non-ulcerated carcinoma. Even with these drawbacks Berant and Gutmann believe that the method will occasionally be a help in the early diagnosis of carcinoma of the stomach.

A New Method of Detecting Gastric Motor Insufficiency. The presence of a considerable amount of food in the fasting stomach in the morning is a sign of decided motor insufficiency and the condition is therefore an easy one to detect in its more advanced stages. The milder grades, however, are exceedingly difficult to diagnose and a number of methods have been devised for this purpose without any of them giving full satisfaction. Such are Sahli's method, and the salol, iodopin, and desmoid tests.

One of the more recent methods is that devised by Mathieu and Rimond, which consists in washing out the stomach one hour after a test breakfast and determining the motor function by the quantity of the breakfast remaining. These observers found that not more than 180 to 200 c.c. from 500 c.c. ingested should be found after an hour's interval in a healthy stomach. However, this method would be rendered inaccurate by the presence of hypersecretion of gastric juice, since the amount of contents in such cases would be much higher than normal, owing to the hypersecretion even if the motility were normal.

Moreover, a combination of motor insufficiency and hypersecretion is very common, and in these cases the amount of contents may be greater than the original breakfast. Consequently motor insufficiency cannot be differentiated from hypersecretion by means of the Mathieu and Rimond method.

Elsner¹ has devised a modification of the Mathieu-Rimond method by estimating not only the total amount of gastric contents remaining after a test breakfast, but also the amount of solid material remaining. And he claims that by comparing the two amounts he can usually differentiate clearly between insufficiency and hypersecretion.

His method is as follows: A test meal is given, consisting of 60 gm. of white bread and 400 gm. of water. This is removed after one hour. The total amount in cubic centimetres is called *b*. Its total acidity is *a*. Then 200 cm. (q.) of water are poured through the tube and it is

¹ Berliner klin. Wochenschrift, 1904, Bd. iv., No. 25.

moved up and down to thoroughly mix it. The contents are again removed and its total acidity is a' . The stomach is then thoroughly washed and the wash-water is saved.

The total amount of contents remaining is then estimated by an algebraic formula suggested by Mathieu and Rimond:

$$x = B \frac{a'q}{a-a'}$$

The whole gastric contents (test meal and wash-water) are then put to settle in two or three large graduates, and after twenty-four hours the amount of solid residue is read off in cubic centimetres.

It is absolutely necessary for the even settling and ready estimation of the solid contents that the test breakfast be taken in a finely divided state so that chymification may be even and without large lumps.

Elsner has found that if the bread is soaked and finely divided before taking, and then remains in the stomach for an hour, the error in estimating the solid particles by settling is very small (not above 20 c.c.).

However, frequently excessive formation of mucus and unevenly divided test meals make the estimation of the solid residue very difficult, especially when the HCl secretion is diminished or absent. In such cases it is better to artificially break up the solid residue mechanically before it is put to settle.

In his list of individuals without marked gastric symptoms the total contents varied from 90 to 250, but averaged about 150, while the solid residue varied from 30 to 100, and varied in the same person on different occasions.

In general it may be said that the solid residue should be 100 c.c. or under. An increase over this amount should indicate a motor insufficiency.

When an increase in the solid residue occurs without increase in the total amount the condition is probably one of uncomplicated motor insufficiency.

Much more common than these uncomplicated cases are those in which motor insufficiency has led to an increase in secretion. In such cases there is an increase in the total amount as well as in the solid residue. As in the following cases:

Total contents	. . . .	321	Solids	. . . . .	140	
"	"	. . . .	389	"	. . . . .	110
"	"	. . . .	358	"	. . . . .	120

The application of the method in cases of anacidity and achylia will of course be simpler, as the relation of the total amount and solid residue will not be disturbed by excessive secretion.

Elsner recommends his method as a practical one for estimation of the gastric motility, but warns against supposing that it is anything

but an approximate test. Future investigation may show that there are other conditions influencing the retention of the solid food particles.

The diagnosis between *motor insufficiency* and *alimentary hypersecretion* has up to this time been considered an extremely difficult one to make,¹ but by this method Elsner claims that they can be easily and sharply differentiated by noting the relation of the total amount of stomach contents to the solid residue.

The Desmoid Reaction. A new test for the functions of the stomach. Sohli² has devised a method to test the activity of gastric digestion. It consists in the ingestion of some stain such as methylene blue or of iodine wrapped in a covering which is only digested by gastric secretion. Then the saliva is tested for iodine, or the urine for methylene blue, and a late appearance of these substances in the secretions indicate a lack of digestive power of the stomach. Sahli first employed as a cover small pieces of goldbeaters' skin, which is pure connective tissue from a cow's intestine. Such fibrous tissue can only be digested by gastric juice. He enclosed 1 gr. of iodoform in a square of the skin and tested the saliva for iodine, which should appear in a few hours. A series of observations upon 92 cases confirmed the accuracy of the test.

He has since modified the technique, since he found that the goldbeaters' skin varied so much in thickness that the tests were not uniform.

He now employs the finest rubber dam, such as is used by dentists, which he ties around the stain with soft catgut, making a little bag. The digestion of the catgut liberates the stain if the rubber does not stick together. To obviate this he takes a piece of rubber 4 cm. square and dusts it thoroughly with talcum powder. In this is placed a pill containing 7 grains of methylene blue and 1 grain of iodoform. The corners of the square are brought together and tied. Then the rubber is trimmed off close, with care to cut each thickness of rubber separately. The mass is heavier than water and sinks to the bottom of the stomach. It should be given at midday and the urine tested at 5 and 7 P.M. by looking for the blue color produced by the excretion of the methylene blue, and again in the morning. The saliva should also be tested for iodine. When gastric digestion is normal the urine shows the stain the same day, provided that the kidneys are intact.

A positive reaction always indicates normal gastric digestion, according to Sahli. A negative reaction in his experience indicates some disturbance of stomach digestion. Experiments performed outside the body have convinced him that nothing but a combination of pepsin and HCl will digest the catgut.

¹ PROGRESSIVE MEDICINE, December, 1904.

² Correspondenzblatt f. Schweizer Aerzte, 1905, Bd. xxxv., Nos. 8 and 9.

An Experimental Study of the Accuracy of Modern Clinical Methods for the Diagnosis of Disorders of the Stomach. Henry F. Hewes¹ has devised another method of detecting stagnation in the stomach. His test shows only very decided motor insufficiency and stagnation and cannot reveal less severe grade of the condition. It is simply and easily applied, though it introduces no new principles of diagnosis. An ordinary meal is employed (corresponding in general to the Leube meal), which is given at 6 P.M. The tube is passed at least twelve hours later and the stomach contents are withdrawn. Hewes finds in the normal stomach under these circumstances an amount of fluid varying from a few drops to 40 c.c. If more than this is obtained it should be considered pathological. Material from Hewes' cases was examined microscopically, with the naked eye, and chemically. The conditions indicating stagnation were: (1) The presence of an abnormally large solid food residue. The merest trace of food was found in the normal stomach, but more than this signifies some retention. All but 2 of Hewes' 26 cases of stasis showed the presence of good amounts of solid food residue. (2) The presence of *sarcinæ*, which were found in 7 of the 26 stasis cases, in all of which there was considerable free HCl. (3) The presence of lactic acid indicates, as Hewes thinks, a considerable degree of stagnation and fermentation. It was present in 8 of the 26 cases of retention. In the only 2 cases showing lactic acid in which the diagnosis was confirmed cancer of the pylorus was found. (4) The presence of abnormal yeast fermentation. This Hewes tests for by adding 10 or 20 c.c. of gastric contents to half the quantity of sterilized 10 per cent. glucose solution. This is placed in any fermentation apparatus (merely an inverted test-tube quite filled with the mixture would do) and the whole allowed to stand in a warm place, preferably in an incubator at 37° C. It is examined at intervals of twelve hours for two days. If more than one-twentieth of the tube is filled with gas after forty-eight hours, then the sediment in the tube must be examined under the microscope, and if this shows freshly budding yeast plants, then the test for excessive yeast fermentation may be considered positive. If less gas than one-twentieth forms the test is negative. According to Hewes, if any one of these tests are positive then stagnation exists and they must all be absent before stagnation can be excluded. *Sarcinæ* and excessive yeast fermentation were not as often present as solid food residue is in Hewes' cases of retention. But the presence of *sarcinæ* and yeast is conclusive of stagnation, even when they are found in the fasting stomach or vomited material, differing in this respect from solid food residue, which must be found after

¹ Boston Medical and Surgical Journal, 1905, vol. clii., No. 24.

twelve hours of fasting to have any significance. Hewes has examined 180 cases of all sorts in which he demonstrated stagnation in 26 by the above method; 21 of the cases in which the diagnosis of retention was made came to autopsy or operation, and in all of them obstruction of the pylorus was demonstrated. In 18 cases without stasis no obstruction and presumably no retention was found.

While Hewes' conclusions are in no way new, he has tabulated several well-known symptoms of retention in such a way as to make them easily applicable clinically and has supported his observations by an interesting series of cases.

Ischochymia and its Treatment. Einhorn has described in two previous papers the condition that he calls by this name. For the benefit of those who have not had the opportunity of reading these communications ischochymia may be defined as clinical dilatation of the stomach with decided retention, and arising from a variety of causes, but usually from pyloric stenosis, which may be benign or malignant. The important part of Einhorn's work is his description of the form of pyloric stenosis, which greatly improves under treatment, although the symptoms are usually severe enough to suggest serious organic stenosis. To quote Einhorn's own explanation:

"The cessation of the symptoms due to the stenosis may best be explained as follows: Let us assume that the pylorus is only slightly narrowed (relative stenosis of the pylorus), so that the usual food passes readily. Through some grave dietetic error an inflammation of the pyloric part takes place, which causes an hyperæmia, perhaps an cedematous swelling of this part of the stomach, and the result is that the canal is nearly impassable. The whole process may best be compared to an angina of the throat. If now, by means of rest and suitable treatment, the acute swelling is made to disappear the former lumen of the canal will be re-established."

In his most recent paper¹ Einhorn gives the statistics of the affection and reports a number of cases illustrative of the various characteristics:

1. Benign ischochymia associated with serious peristaltic unrest of the stomach cured by medical methods.

It is now generally known that cases of this description which are caused by a moderate stenosis of the pylorus may be improved or cured by medical means alone. In these cases dilatation is not very great and the peristaltic restlessness is absent or only slightly present. Not only these milder forms but even cases of tremendous dilatation with marked unrest and retention can be cured by palliative treatment.

2. Cases of ischochymia with a history of short duration and even

¹ American Medicine, June 3, 1905.

with tumor formation that proved not to be malignant. Usually in cases of benign ischochymia the patients give a long history of suffering with periods of comfort, whereas cases of malignant ischochymia show a short history (three to eight months), with constant suffering. Einhorn reports 2 cases in which such a course was very suggestive of cancer, but which recovered completely.

The presence of a tumor in such cases is usually supposed (and rightly so) to point almost conclusively to malignancy. Yet Einhorn reports 2 cases, both men, aged thirty-six and forty-five years respectively, in which tumors were present with dilatation and peristaltic restlessness. Operation in both showed a tumor of the pylorus that was diagnosed cancer by the surgeon.

The abdomen was closed without interference in the first case and gastroenterostomy was done in the second. Both recovered completely under Einhorn's treatment, proving that the tumors could not have been malignant.

3. Cases of benign ischochymia with ulcer at the pylorus and continuous hypersecretion. Cases of this sort are occasionally encountered in which there are three stages of the disease. There is hyperacidity for years which is more difficult to treat than is the ordinary form and shows a tendency to recur. This leads us to the discovery that hyperacidity has turned into hypersecretion. There is much pain and perhaps vomiting. After hypersecretion has lasted for a year or more dilatation occurs. This forms the third and gravest period of the disease.

In these cases there is usually an ulcer near the pylorus (either in the stomach or duodenum). Medical treatment is usually of no avail in this form of ischochymia with stenosis and ulceration, and operation is almost always indicated. In the past few years Einhorn has observed 6 pronounced cases of this type, in all of which he strongly advised operation after the symptoms had persisted even after rectal feeding and liquid diet.

Three were operated upon, of these 1 died soon after the operation and the other 2 recovered and were entirely free from all symptoms. The other 3 refused any surgical interference. Of these 2 died, 1 from a perforation and the other from a duodenal hemorrhage, while the third slowly improved and almost entirely regained his health.

THE TREATMENT OF ISCHOCHYMIA. Einhorn's own words are concise and comprehensive: "There are two ways of treating ischochymia: dietetic and medicinal measures (rectal alimentation, fluid diet, lavage of the stomach, bismuth, etc.) and operative procedures (gastroenterostomy, pyloroplasty).

These two methods of treatment do not antagonize but supplement

one another. The indications for both are fairly well determined; where one ceases the other begins.

Since in by far the larger number of cases of ischochymia a stenosis of the pylorus is present the ideal method of treatment would consist in forming a new passage for the exit of the chyme from the stomach. Yet surgical intervention ought not to be recommended immediately in every case, as a certain element of risk is still attached to this procedure. The mortality of gastroenterostomy and pyloroplasty is rather high. It varies among different surgeons and in different countries between 5 per cent. and 20 per cent. If we assume 10 per cent. as the average (among my own patients the mortality was much higher), we see that we have a mortality percentage that ought to be taken into consideration in advising an operation."

The indications for medical and surgical treatment of ischochymia may be placed as follows:

1. Benign ischochymia requires first medical treatment; if this be unsuccessful—*i. e.*, if after a longer period of treatment the fasting stomach, on a fluid diet, is not empty but contains food remnants—an operation is advisable.

2. Surgical intervention is also indicated in benign ischochymia which has developed subsequent to a condition of continuous hypersecretion of gastric juice (preceded by hemorrhage or not).

3. Malignant ischochymia or one of dubious nature in which, however, a thickening of the pylorus is found, should also be treated surgically (gastroenterostomy, and, if possible, resection of the pylorus).

The Motility of the Stomach in Achylia Gastrica. Elsner¹ employed his method to estimate the gastric motor sufficiency in a series of cases of simple achylia and found that the motility varied very much in different cases. This confirms what most of the best authorities have always assumed, namely, that gastric motility is good in cases without gastric symptoms, the intestines assuming the function of the stomach.

The Action of Hydrochloric Acid and Pepsin and Gasterine in Hypoacidity and Achylia. The question as to whether artificial stomach digestion should be attempted at all in cases when gastric secretion is entirely suppressed has been much debated. The alternative is to leave the whole digestion of the food to the intestine. Personally, I have always seen good results follow the administration of hydrochloric acid in such cases except in the rare instances when there is a hyperæsthesia of the gastric mucous membrane and in which the acid produces discomfort.

The recent observations by Heichelheim and Kramer² support this

¹ Deutsche med. Wochenschrift, 1904, Bd. xxx., No. 42.

² Münchener med. Wochenschrift, 1904, Bd. li., No. 32.

view. They have investigated the action of hydrochloric acid and pepsin and also of *gasterine* (a new proprietary preparation which is made from the gastric juice of dogs) by the method introduced by Pawlow, in which a so-called secondary stomach is formed so that the gastric juice can be obtained perfectly pure and unmixed with food. In the first part of the investigation they compared the *gasterine* which was obtained from Paris with the gastric juice obtained from dogs in their own laboratories by the technique mentioned. They found that the *gasterine* was very active both in free acid and in pepsin. The free acid of the pure juice was between 100 and 150, and the pepsin, according to the old Metts method, was 4 to 5, while in the *gasterine* the free acid was 94 and the pepsin 2.8.

The points they desired to investigate were, first, the relative value of hydrochloric acid and pepsin and *gasterine* as aids to digestion in cases in which the stomach secretion was practically suppressed, and, secondly, whether any or all of these remedies produced lasting benefits. If this was not so, whether digestion was aided at all by their administration.

The investigation was restricted, as has been said, to those cases in which repeated investigation showed that the hydrochloric acid and pepsin as well was either greatly diminished or entirely suppressed.

Cases in which there was a decided nervous element, especially instances of the so-called heterochylia, were rejected, since one can never be sure that the achylia in such cases is constant and does not alternate with a gastric secretion that approaches normal.

The technique that the writers employed in their experiments was scientific and thorough. They tested each remedy in succession, and then followed them up on the next day by a test meal without the remedy as a control.

The summary of their results is as follows: They found that no results were obtained with less than 100 c.c. of the *gasterine*. This was compared with 100 c.c. of a decinormal hydrochloric solution, and also with 100 c.c. of decinormal salt solution and 5 gm. of pepsin. The remedy in each case was given with a test meal, and the meal was removed after a suitable interval and examined for free HCl and combined HCl and pepsin, and by the Biuret test.

The division of the food in the chyle was also considered. They found that the test meal was always better digested after the administration of *gasterine*, and that the remedy without doubt exerted a favorable influence upon digestion, provided that the necessary amount, 100 to 150 c.c., was given.

Gasterine, however, was no more powerful in its effects than the artificial mixture of hydrochloric acid and pepsin, provided also that it was given in the quantity mentioned. Free hydrochloric acid itself in

the absence of pepsin did not influence digestion. However, neither gasterine nor the artificial gastric juice had any lasting effect upon digestion. Their only action was in digesting the meals with which they were given.

The writers think, however, that a general tendency of withholding hydrochloric acid in these cases of achylia is not a good one. Upon the ground of their investigations they think that large doses of pepsin and hydrochloric acid have a most favorable effect upon digestion in these cases of hypochylia and achylia, especially when the appetite is poor and when there is fermentation of the stomach or diarrhoea.

The writers have also investigated the artificial stomach juice made from pigs, which is also a proprietary preparation, and is known as *dyspeptine*. The remedy had been given a trial in Riegel's clinic, but without good results. Further investigation showed that it contained no free hydrochloric acid and little or no pepsin.

Walter Erb¹ has also investigated dyspeptine in a series of clinical investigations. He finds that it is distinctly disappointing in its results. Chemical investigations showed the absence of hydrochloric acid and insignificant amounts of pepsin.

The amount of pepsin that was found necessary to produce results is very much larger than is usually given by American physicians. I suppose that 5 grains of pepsin is considered a fair dose, though Heichelheim and Kramer found that 75 grains was needed to obtain artificial digestion.

Balneology in Gastrointestinal Disease. In spite of the enthusiastic physical and chemical investigations into the action of various mineral waters the old empirical methods still control their administration, and our investigations have merely confirmed scientifically to some extent what had been in the past discovered by experience alone. Even now experiments give very conflicting results, sometimes confirming and at others conflicting with the empirical rules of the various water cures. However, it is beyond dispute that balneotherapy does benefit many forms of gastrointestinal diseases, though precisely how much of the improvement is due to water and how much to the regulation of diet, habits of life, and change of air must be uncertain still. Ewald² considers the action of various mineral waters upon gastrointestinal diseases under four headings: First, the indifferent or almost pure waters and the alkaline carbonate waters; second, the alkaline muriatic and chloride of sodium water; third, the alkaline and saline waters and bitter waters (Glauber's salts); fourth, sulphur waters and calcium waters. The

¹ Münchener med. Wochenschrift, 1904, Bd. li., No. 32.

² Berliner klin. Wochenschrift, 1905, Bd. xlii., No. 15.

indifferent waters are used merely to cleanse the gastrointestinal tract. Taken into a fasting stomach in the morning pure water passes through the tract quickly, removing with it remains of food, mucus, and stomach contents. It will also dilute and carry off the acid stomach contents that collect in the fasting stomach in hypersecretion. Besides its cleansing and diluting action large amounts of pure water washes the blood and decreases any tendency to intoxication with abnormal metabolic products by increasing the daily amount of urine. The action of pure water is the real basis of benefit derived from the use of heated water, the temperature merely influencing the process of absorption. Second, the active principle of the second class of water depends upon carbonate of soda and CO_2 gas. Clinical investigations into the action of such waters show the greatest divergence, ranging from the diminution in HCl to the production of hyperacidity. From this it is clear that the purely chemical power of neutralization possessed by the carbonate of soda is overcome by the physiological activity of the gastric mucous membrane. The explanation for the different results obtained by different investigators lies in the fact that the same dose of soda will produce very different effects when given at different stages of digestion. Thus, as Limossier has shown, a moderate dose of soda given shortly after food is taken will diminish the HCl secretion. Later, such a dose will increase it to its normal, and finally when given near the end of digestion the soda will produce a hyperacidity. This should be borne in mind when ordering alkaline waters, which may thus be used to advantage in hyperacidity as well as in hypoacidity by varying the time of administration. The carbonic acid gas in such carbonated or sparkling waters, in contrast to the action of the soda, has a constant and decidedly stimulating effect upon gastric secretion and thus modifies the action of the soda. Such a carbonated water is quickly absorbed, the gastric secretion under its influence begins earlier and reaches a greater amount, and the motility of the stomach is increased so that it is emptied earlier. Third, the alkaline muriate waters, including pure chloride of sodium water, have certainly a decided effect upon the functions of the gastric mucous membrane. In 1888 Boas showed that hot salt water had a very beneficial effect in increasing gastric secretion, and later confirmed this clinical observation by showing that intravenous injections of salt increased the gastric juice. The latest investigations upon this subject, namely, those by Meinel,¹ have confirmed this work of Boas. Meinel showed that the taking of only 250 c.c. of Weisbaden Kochbrunnen or other saline waters, carbonated or not, causes HCl secretion to appear earlier and to reach a greater amount than in his control experiments.

¹ *Zeitschrift f. Diät. und Physiol. Therapie*, September 1, 1904.

Dopper¹ has confirmed Meinel's results and found that the influence of such saline waters were particularly beneficial in the gastric catarrhs produced by alcoholic excess or the abuse of tobacco. It appears quite definitely settled that a course of such a saline waters has not the power of increasing nitrogen elimination that has been claimed for them. This is really not a disadvantage, for it permits the use of these waters in cases in which it is not desirable to have nitrogen loss—as heart disease, obesity, and in debilitated people.

Saline waters are generally supposed to have some power of dissolving mucus and are, therefore, recommended in cases of chronic gastritis. However, Ewald is not sure that the benefit that comes from their use in such cases arises in their power of dissolving mucus. At autopsy the mucus of chronic gastritis is hard and very tightly adherent, and it can be demonstrated outside of the body that such mucus is not dissolved by long soaking in salt solution. But that such cases are often benefited by a course of such waters is undeniable.

The same may be said of hyperacidity in neurasthenia, and also certain cases of acid gastritis without neurosis, with dilated stomachs. These patients ought not to be benefited by saline waters, as usually HCl is increased by their use; but whether it is the manner in which the waters are taken or the general *régime* of the cure, it is certain that such conditions are often decidedly benefited by a course of saline waters.

The *alkaline-saline* waters are known empirically to benefit cases of suppression of HCl secretion except those dependent upon a mucous catarrh or atrophy of the gastric mucosa. The attempts to demonstrate scientifically what the action of these waters is has given very confusing results. It may be that the effect of the waters upon HCl secretion differs at different periods of the case, and probably the diet and discipline of the course of treatment have much to do with the patient's improvement.

The action of waters containing *Glauber's salts*, which include the Carlsbad waters, is not well settled, and their use is governed by empiricism.

Investigation into the aromatic products of putrefaction, especially the ethereal sulphates and fatty acids of the urine, has shown no deviation from the normal, under the influence of such waters.

The observation of Carciani² shows that waters containing Glauber's salts have a very considerable power of increasing bile secretion. His experiments were made upon a man with a gall-bladder fistula in which part of the bile came through the fistula and part passed down into the

¹ Ueber den Einfluss der Koch-salzquellen auf den Stoffwechsel des Menschen, Berlin, 1904.

² Riforma Medica, 1902, No. 160.

intestine. When the patient drank 1 litre of Montecatini, Carlsbad water, the bile increased from 90 to 100 c.c. to 142 c.c., while its solid substance was proportionately increased.

The *temperature* of the water influences the time of its absorption. Hot water (50° to 55° C.) is very quickly absorbed, and it seems probable that it increases secretion and also the motility of the stomach.

The influence of *baths* upon gastric digestion can only be indirect. If they influence the general condition of the patient for the better the condition of the gastrointestinal tract is also benefited.

Lindemann¹ found that *cold sea baths* had a decided tonic action upon the function of the stomach and intestines. They are contraindicated in most organic diseases of the stomach, especially when the lesion is of an inflammatory character.

The *diet* in the water-cure establishment is a very important part of the treatment, and Ewald protests strongly against the fashion, that seems to be growing in favor, of relaxing the strict rules which have always been in force. It may be entirely true that the drinking of mineral water does not interfere with a liberal diet, but most of the patients at "water cures" live much more freely than is good for them, and the restriction of their diet during the cure is responsible for a very large, if not the largest, part of the benefit they receive.

Ewald closes his article with the statement that all rules for a course of balneotherapy must be suited to the peculiarities of the individual, and are to be determined by the patients' social position, state of nutrition, habits of life, etc. Some are benefited by a liberal *régime* and some must be restricted. We can determine into which class each patient falls only by experience.

Occult Blood in the Feces as a Symptom of Gastric Disease. The clinical significance of occult blood and the technique of its detection were considered in PROGRESSIVE MEDICINE for December, 1904 (p. 24). In the year that has elapsed many series of observations have been reported and the methods of detection have been elaborated. There have been papers by Joachim,² Schloss,³ Koziczekowsky,⁴ Petrachi,⁵ Steele,⁶ Steele and Butt,⁷ Clemm,⁸ and Ledeschi.⁹

I have personally had considerable experience with the test and am

¹ Deutsche med. Zeitung, 1897, No. 26.

² Berliner klin. Wochenschrift, 1904, Bd. xli., No. 15.

³ Archiv f. Verdauungskrankheiten, 1904, Bd. x.

⁴ Deutsche med. Wochenschrift, 1904, Bd. xxx., No. 33.

⁵ Zeitschrift f. klin. Medizin, 1905, Bd. lvi.

⁶ Pennsylvania State Medical Journal, February, 1905.

⁷ American Journal of the Medical Sciences, July, 1905.

⁸ Archiv f. Verdauungskrankheiten, 1904, Bd. x., No. 4.

⁹ Gazzetta degli ospedali, January 22, 1905.

convinced that the presence of occult bleeding from the gastrointestinal canal is a symptom of much importance provided various sources of error can be eliminated. What these conditions are can be told perhaps as well as in any other way by quoting conclusions from my own paper.

During the past winter I have examined 720 stools for occult blood from 100 patients in the wards of the Presbyterian Hospital. Besides this I have made several series of observations upon the stools of normal individuals to determine the effect of food and iron upon the test.

Occult bleeding has in general the same clinical significance as visible hemorrhage, except that its recognition is a much more delicate means of diagnosis because the quantity of blood present is so small.

Practically, however, the presence of occult blood is of decided diagnostic value chiefly in the detection of gastric or duodenal ulcer or gastrointestinal cancer, because it occurs with considerably more regularity and frequency in these two affections than in any other condition of the alimentary tract.

The subject has been developed particularly along these lines, and most of the work done so far has been directed by the desire of obtaining a new and useful aid in the detection of ulcer and cancer. The value of the sign depends, of course, upon the care with which various sources of error are eliminated.

On the other hand, the absence of occult blood is of equal and perhaps greater value in diagnosis than its presence. Here there is no element of possible error, and if blood is not found after a series of examinations in any case, then cancer and ulcer can be excluded.

The presence of occult blood will be of value in the diagnosis of carcinoma and gastric ulcer only when sources of bleeding that have no significance are excluded. Since the test is very sensitive, very small amounts of blood can be detected, and naturally the liability to error in determining the origin of the hemorrhage must be greater than in large and visible hemorrhages where the condition of the blood may indicate whether it comes from high up or low down in the gastrointestinal tract. Thus, as has been said, various foodstuffs containing hæmoglobin, if present in large enough amounts, will give the reaction, and blood in the stools may occur after epistaxis, hæmoptysis, and in cases of hemorrhoids. Consequently, an important part of the study of occult blood should consist of experiments to determine in what conditions the reaction may occur without significance in the diagnosis.

The sources of error in the correct interpretation of the presence of occult blood in the stools in the diagnosis of cancer and gastric ulcer arise in the difficulty of excluding all other sources of small hemorrhages. These are many in number and variety. It is usually possible to exclude the conditions that would produce such uncertainty, and it is often

worth while to go to considerable trouble to do so, as in the use of the proctoscope, etc. Tuberculous ulcer, typhoid fever, hemorrhoids, fissure, or purpura can usually be excluded with more or less certainty.

On the other hand, it will often be impossible to eliminate conditions that might give rise to error, and sometimes one cannot be certain whether the blood comes from a gastric ulcer or gastrointestinal cancer, or is a symptom of some other affection that it will be impossible, at the time, to exclude. An example of the last condition is cirrhosis of the liver, of which my list contained two cases, both with blood in the stools. One of these was a perfectly typical case in the advanced stage, with small liver, large spleen, and ascites, and I was never at a loss to explain the blood, which probably came from the œsophageal plexus. In the other case operation disclosed duodenal ulcer and in addition cirrhosis of the liver. The symptoms were fairly typical of ulcer, namely, hyperacidity, anæmia, rather indefinite epigastric pain, and occult blood in the stools. There was no jaundice, ascites, hemorrhoids, or other decided signs of portal obstruction. We found, however, a typical small, rough, cirrhotic liver with exceptionally good collateral circulation through the deep veins of the abdominal wall, which explained the absence of indications of portal obstruction. I was impressed by the fact that all of the symptoms could have been produced by the cirrhosis alone without the ulcer, including the occult bleeding, and am inclined to think that cirrhosis of the liver will be one of the conditions most liable to cause error in the interpretation of occult bleeding, because it so often exists without symptoms, or with very indefinite symptoms of gastrointestinal disorder, and, besides, shows occult bleeding in the stool quite regularly and frequently.

I have arranged a table of the conditions which might give rise to confusion, appreciating the fact that the list is incomplete, but give it because it represents my own experience and conclusions.

Extraneous: Red meats, carmine, swallowed blood from any cause, hæmoptysis, epistaxis, and menstruation.

Arising from gastrointestinal tract: Cirrhosis of liver, purpura of gastrointestinal tract, tuberculous ulcer, typhoid ulcer, hæmophilia, hemorrhoids, and fissure and fistula of rectum.

In my experience the aloin reaction has proved the more reliable and less liable to be obscured by urobilin in the ethereal extract, and I therefore think that it is the more dependable test. However, the guaiac reaction has given very satisfactory results; indeed, almost as satisfactory as the aloin. I employed both tests upon every stool and seldom found one positive without the other, but never considered that blood was present unless a clear reaction with aloin was obtained.

All observers, from Boas to Koziczkowski, recommend the aloin test as

the more reliable and delicate. It has the advantage that it is not as much obscured by bile pigments or chlorophyll in the ethereal extract, and, as has been said, it is extremely delicate. Koziczowsky experimentally found that the reaction demonstrated 0.25 gm. of blood in 2 gm. of feces.

He has noticed that the liability to error in the color reaction due to the presence of considerable urobilin or chlorophyll in the ethereal extract is much increased by artificial light, and says that the test should always be done in daylight.

He also found that carmine in the stool gave a red color in the reaction almost exactly like the color of the blood reaction. Consequently charcoal should be used instead of carmine to mark a test diet if this is employed.

I found in my work in the weeks that I used beef-juice—namely, the juice from rare beef—gave a strong positive reaction, invariably within twenty-four hours of the ingestion.

Therefore, before a positive test can be considered of any value, red meats and beef-juice should be cut out of the patient's diet for at least twenty-four hours before the test is made. It would probably be safer to give a still longer interval or to mark off the meat-free diet with charcoal and not to make the test until the charcoal appears in the stool.

The test for occult blood must often be made while the patient is upon rectal feeding. Meat extracts occasionally are used in nutritive enemata, and we have shown that some of these meat preparations will give the reaction for occult blood. Therefore, when the stools contain portions of these enemata, the particular beef extract employed should be tested to see whether or not it gives the reaction for blood.

The question as to whether various preparations of iron taken by the mouth will give a reaction in the stools similar to that of blood is an important question, since iron will be very often given in gastric ulcer or other anæmic conditions while the stools are being tested. I have examined the stools of patients who were taking various iron preparations by the mouth. The forms of iron employed were ferric carbonate, 30 grains a day; Bland's pill, 30 grains a day; ovoid ferrin, 1½ ounces daily; peptomangan, 1½ ounces daily. These preparations were taken for at least one week, and never during their administration did I obtain a reaction similar to that of blood in the stools.

I think that these results apply equally well to all other preparations of iron, since the iron in the stools usually has been changed into a sulphide by the time it reaches the rectum, and the stools tested were always greenish-black.

The ingestion of iron need not be considered in examining the stools for occult blood.

PUS IN THE FECES. A suggestion has been made based upon the work of Brandenburg, who found a nucleoalbumin in pus capable of giving a blue reaction with guaiac, that pus in the stools might be a source of error in the detection of occult blood. I am inclined to think that this objection is not well founded because the blood tests are made with an ethereal extract, made after the feces have been mixed with acetic acid, which should precipitate this nucleoalbumin that causes the reaction similar to that of blood.

It is hard to demonstrate experimentally that pus will not give the test, because it is difficult to obtain pus which is perfectly free from blood. I have tested three specimens of urine containing much pus, and three specimens of pus which were obtained in such a way that they contained very few blood cells, as demonstrated by the microscope with the following result: An acetic acid ethereal extract of pure pus from the urine does not give the reaction for blood. A specimen of pus containing a very small amount of blood gave only a very slight reaction by the aloin and guaiac tests, which might be explained by the red blood cells present. However, if the substance responsible for the reaction was derived from the leukocytes of the blood and not from the hæmoglobin, then with pus the reaction should have been very intense indeed, which was not the case.

Weber, in his original article upon the detection of blood in the stools, found that the spectrum analysis of an acetic acid ethereal extract of feces containing blood showed hæmatin; consequently, it is reasonable to suppose that the substance in the acetic acid ethereal extract which gives a reaction for blood is derived from the hæmoglobin, which has been changed by digestion into hæmatin.

All of the preceding indicates that if the feces are thoroughly mixed with acetic acid before the ethereal extract is used, pus will not be a source of error in the detection of occult blood.

CLASSIFICATION OF DISEASES IN RELATION TO OCCULT BLOOD IN THE FECES. *Positive Reaction.* Cancer of the gastrointestinal tract; gastric and duodenal ulcer; benign pyloric stenosis with stagnation; cirrhosis of liver; purpura; tuberculous enteritis, typhoid fever (infrequently). *Negative. Gastrointestinal diseases.* Gastric neurosis with anacidity, subacidity, hyperacidity, heterochylia, or normal secretion; chronic constipation; mucous colitis, cholecystitis, and hyperacidity; achylia gastrica; chronic gastritis, with anacidity or normal acidity. *Negative. Miscellaneous diseases.* Pernicious anæmia; severe anæmia secondary to malnutrition; phthisis pulmonalis; ulcerative endocarditis; pneumonia; influenza; acute mania; diabetes mellitus, herpes zoster.

Carcinoma of the Stomach. **HYPERACIDITY IN GASTRIC CARCINOMA.** Statistics show that free HCl is present in the stomach contents in 10 to

13 per cent. of all cases of cancer of the stomach. This free acid, when present, is usually diminished in amount, though occasionally it may be normal or even increased.

Hyperacidity in the course of gastric carcinoma is generally considered to be always due to one of two causes: either a cancer develops upon the floor of an ulcer, or, according to Richter, the hyperacidity may be a part of the general neurotic disposition and may persist during the development of the carcinoma.

Ziegler,¹ however, reports a series of cases apparently of a new type. Here decided hyperacidity is present in the early stages without neurasthenia or ulcer, as was demonstrated by operation or autopsy.

In the first stage there are the typical symptoms of hyperacidity, coming on suddenly in an individual who has been apparently in perfect health. Motility is good, there is an hyperacidity of from 58 to 80 for free HCl and 90 to 120 for the total acidity. The blood is normal and there is no loss of weight.

The picture is that of a typical hyperacidity of functional origin, except that the condition is extremely resistant to the remedies that usually afford relief. In single cases there may be even in the first stage a peculiar aversion to meat and constant pain without reference to the contents of the stomach.

In the second stage the acid may be still increased or it may fall to normal or below. Motility is impaired and the production of mucus is increased. The patient's general condition is no longer good, anæmia develops, the tongue is coated, and the pain is constant and aggravated by food. There may be lactic acid and Oppler-Boas bacilli.

In the third stage the picture is that of a typical gastric carcinoma.

In the first and second stages a diagnosis is often impossible and is at all times difficult. However, Ziegler directs attention to the following points of difference between functional hyperacidity and cancer with hyperacidity:

1. Silver nitrate, atropine, bismuth, and the alkalies cause only temporary improvement.
2. There is a peculiar aversion to meat, and the appetite is poor.
3. There is often anæmia of a grade unusual in functional hyperacidity.
4. Advanced age is against functional hyperacidity.
5. The development of gastritis and the disturbance of motility should always, in a case of functional hyperacidity, be considered extremely suspicious.

Ziegler does not pretend to explain the excessive formation of acid,

¹ Zeitschrift f. klin. Med., 1904, Bd. liii.

but gives it as his opinion that the cancer is primary and the hyperacidity directly dependent upon it. It is of interest in this connection that Ziegler himself makes the statement that hyperacidity is more frequent in Karlsruhe than in other parts of Germany, probably on account of the albuminous diet of the inhabitants, who consume large amounts of proteids, coffee, and white wine, and relatively small amounts of fat. It is significant that these cases of hyperacidity in cancer all occurred in the St. Vicentius Hospital in Karlsruhe.

Honigman¹ reports a case of hyperacidity and carcinoma of a somewhat different type and with a very peculiar course.

The patient had suffered for many years with functional hyperacidity and hypersecretion, apparently due to a neurosis. There was some atony as well. The patient had improved under treatment and had gained some weight. Suddenly after a slight hemorrhage the whole clinical aspect of the case changed. The motor power of the stomach failed entirely, the hyperacidity and hypersecretion gave way to an anacidity and an achylia, and the patient began to lose flesh and strength. At the same time attacks of tetany made their appearance. The condition of the patient became so serious that an exploratory operation was undertaken, and upon opening the abdomen a pyloric cancer was found with many miliary metastases in the mesentery. A gastroenterostomy was done and the abdomen was closed. The attacks of tetany ceased, but the patient rapidly lost flesh and died in ten weeks. The sudden change in the patient's condition was probably due to the breaking of the growth into a small bloodvessel, thus causing a hemorrhage and metastasis and the conversion of a local process into a general one.

At the autopsy a non-ulcerated carcinoma of the pylorus was discovered which had narrowed but had not closed the pylorus. The stomach was much dilated.

The case is of interest on account of the sudden change from hyperacidity to anacidity, and the sudden onset of serious symptoms. It suggests that the intoxication by the specific toxin of cancer has more to do with the anacidity than any secretion from an ulceratory tumor, since this tumor was not ulcerated and the change was so sudden.² The breaking of the cancer into a vessel and the general metastasis would of course greatly increase the production of the specific cancer poison.

THE PRESENCE OF LONG, THREAD-LIKE BACILLI IN BLOOD CLOTS IN THE STOMACH CONTENTS, AND THEIR SIGNIFICANCE IN THE EARLY DIAGNOSIS OF CARCINOMA OF THE STOMACH. Heichelheim,³ writing from Riegel's clinic, says that the long, thread-like bacillus known as the

¹ Zeitschrift f. klin. Medizin, 1904, Bd. liii.

² PROGRESSIVE MEDICINE, December, 1903, p. 30.

³ Zeitschrift f. klin. Medizin, Bd. liii.

Oppler-Boas bacillus can be found most readily in the dark-brown blood clots that are often found in the stomach contents of cases of carcinoma. In his experience these clots were present in 97 per cent. of a series of 43 cases that he analyzed. He distinguishes between the darker clots in which the microscope shows very few unaltered red blood cells and the fresh red clots with unchanged corpuscles. The former comes from the stomach, the latter probably from the pharynx, nose, or oesophagus, and are due to the passage of the tube.

The presence of large, or even moderate, numbers of the bacilli with these clots after a test breakfast which shows no free HCl is greatly in favor of carcinoma, while the finding of single bacilli in the clots also favors carcinoma, but not so strongly.

His conclusions are based upon the study of 43 cases, in 20 of which gastric carcinoma was demonstrated by operation or autopsy. In all the cases of cancer there was disturbance of motility and lactic acid was demonstrated in the gastric contents comparatively early in the disease. Dark-brown blood clots were found in all but 3 per cent., and bacilli were present in every case. The remaining 23 patients were cases of anacidity of various causes with good motility. Their stomach contents contained no clots and only occasionally a single bacillus.

The explanation for the presence of bacilli in the blood clots may be found in the fact that the cultivation of these bacilli is most successful when a few drops of blood is added to the culture medium. Heichelheim goes farther and suggests that there may be something in the blood from a cancer that specially favors the growth of these bacilli, and that is why they are found in the clots from carcinomatous ulcers and not in those from simple ulcers.

A very interesting and important part of his investigation was that which showed the presence of bacilli in the clots in the stomach contents of six cases of carcinomatous ulcers, in which there was also hyperacidity. The bacilli were not numerous and not always easy to find.

The presence of the bacilli in contents in which there was an excess of HCl and absence of lactic acid is against the usually received idea that these bacilli grow only in lactic acid. If Heichelheim is right their presence is much more significant of cancer than has been supposed. As was said in *PROGRESSIVE MEDICINE* of last year (December, p. 48), there has been a general idea that the presence of Oppler-Boas bacilli had about the same diagnostic value as the presence of lactic acid.

Heichelheim thinks that it is probable that the bacilli are protected from the free HCl by the blood clots and by the deepness of the fissures in carcinomatous ulcer. The stomach juice cannot penetrate as deeply into the crevices of an ulcer with edges and floor infiltrated by cancer as it can into a simple peptic ulcer whose walls are not infiltrated. Con-

sequently, the bacilli are not affected by the excess of HCl in carcinomatous ulcer and are found in the blood clots covering the carcinomatous ulcers.

In a series of 50 stomach contents containing clots from various diseases, including cases of chronic gastric ulcer, the bacilli were absent, or present in such small numbers as to be disregarded. This, of course, suggests that the growth of the bacilli is dependent upon some specific characteristic of cancer and not upon the presence of lactic acid, as has formerly been supposed. Future investigation is needed.

FLAGELLATE PROTOZOA IN THE HUMAN DIGESTIVE TRACT. The papers of Cohnheim,¹ Zabel,² and Rosenfeld³ indicate that the presence of some forms of protozoa may be a symptom of carcinoma of the cardiac end of the stomach and lesser curvature without pyloric obstruction or of the lower end of the œsophagus. These protozoa are usually flagellate and the trichomonas intestinalis is the organism oftenest found. The three observers mentioned have found trichomonas with much regularity and for a period of some months at a time in 12 cases of carcinoma. Only once in a case reported by Rosenfeld were they found in a non-carcinomatous patient and then only twice. The flagellates are commonest when there is complete achylia and are easiest found in the neutral or slightly alkaline contents removed from the fasting stomach. Once, Rosenfeld found them in the stomach contents containing a good amount of HCl, but they never occurred in the lactic acid contents of pyloric carcinoma. The number of observations are as yet too small to say definitely whether the presence of trichomonas-todes is constant enough in the forms of gastric carcinoma which are not accompanied by retention to be of diagnostic value.

The trichomonastodes certainly have no pathological significance in the stomach, and the same may be said of their connection with the so-called flagellate diarrhoeas. It has never been proven that they have any power of producing local disease of the intestines and their presence in the stools during the inflammatory condition of the intestine is almost certainly of no significance and the cause of the diarrhoea must be sought in some other condition. Rosenfeld gives several examples of this in which the intestinal disturbance was produced by enteritis after dysentery, tapeworm, ascaris disease, intestinal polyp, etc. The flagellate protozoa were present in every case, but evidently had no causal relation with the intestinal symptoms.

GASTRIC COLIC FISTULA. G. Sandberg⁴ describes a case of carcinomatous gastrocolic fistula with some unusual features. The patient

¹ Deutsche med. Wochenschrift, 1903, Bd. xxix., No. 12.

² Wiener klin. Wochenschrift, 1904, Bd. xvii., No. 38.

³ Deutsche med. Wochenschrift, 1904, Bd. xxx., No. 47.

⁴ Zeitschrift f. klin. Medizin, Bd. lvi., parts i. and ii., p. 13.

was a man aged forty-four years, who in March, 1903, began to vomit blood and to suffer with epigastric pain. In March, 1904, an indefinite tumor mass developed under the left border of the ribs. Lavage showed much retention over night, no free HCl or lactic acid, and the presence of long bacilli. In April the same year he began to vomit masses of fecal matter. For the next two months the patient would have this fecal vomiting combined with the passage of fecal stools and then suddenly would develop a lientery in which directly after eating he would pass stools consisting of stomach contents containing lactic acid, long bacilli, and unchanged muscle fibre. During the period of lientery he was free from pain, but just before the return of fecal vomiting he suffered greatly from abdominal cramp. Peristalsis of the stomach was very discernible through the abdominal wall. A diagnosis of gastrocolic fistula was made chiefly because the distance from the mouth to the rectum appeared to be so short. In one hour after ingestion the food was in the stool. When various kinds of meat were taken they could be recognized in the stool. The stomach was not inflated because of the great pain. At autopsy the stomach was found to be adherent to the transverse, ascending and descending colon. The cancer mass was at the cardia extending from the œsophagus down to the greater curvature. There was an opening from the stomach into the splenic flexure of the colon. As a result of the adhesions between the splenic flexure and the greater curvature, the lumen of the transverse colon was decidedly obstructed just in front of the splenic flexure, and the transverse and ascending colon behind the stricture was considerably dilated.

The sudden change from lientery to fecal vomiting and fecal stools is not a common symptom of gastrocolic fistula. Indeed, there does not seem to be any case reported of a similar nature. The following is probably the explanation: Sometimes the greater part of the food went directly by the shortest route from the stomach to the bowel and was passed by the ascending colon into the rectum. During this period there was lientery and discharge of gastric contents through the rectum. The quick discharge of stomach contents prevented vomiting. During the period of lientery the pylorus was still patulous and a certain amount of food would pass along the normal channel. This passed down, became fecal matter, and collected in the dilated portion of the colon in front of the narrowing at the splenic flexure, causing the dilatation and producing the cramp-like pain. Finally, when enough feces had collected it forced its way through the stricture: part of it went into the stomach and was vomited, and a part of it passed down and formed the fecal stool. It is very unlikely that there was any true reversed peristalsis.

Gastric Ulcer. INCIDENCE OF GASTRIC ULCER IN AMERICA. The pathological data collected by Howard¹ show that gastric ulcer is less frequent in America than in London or upon the Continent, and that it is more common in the northeastern than in the more southern regions of America, with the exception of San Francisco. His autopsy figures are as follows:

San Francisco	2.35
Boston	1.84
New York	1.42
Philadelphia	1.21
Montreal	1.04
Cleveland	0.92
Baltimore	0.85
<hr/>	
Average	0.32
London	4.6
Europe	8.5

Howard as well as Brooks calls attention to the fact that pathological data do not give a true idea as to the frequency of gastric ulcer.

Open ulcers are often overlooked, since they are small and are not surrounded by areas of inflammation. Small superficial scars must frequently be missed at autopsy and there may be scars not due to ulcer.

With the idea of determining the clinical incidence of ulcer, Howard collected a total of 930 cases diagnosticated as gastric ulcer from a total of 161,599 admissions to fifteen different hospitals in the United States and Canada.

He found that the clinical figures corresponded closely to the pathological, and that clinically, as well as pathologically, ulcer is more frequent in the northeast and is less frequent in America than abroad.

The clinical figures are as follows:

Boston	1.28
Montreal	0.92
New York	0.44
Cleveland	0.38
Baltimore	0.37
Philadelphia	0.16
Chicago	0.15
Denver	0.12
<hr/>	
Average	0.57
London	0.78
Berlin	1.33
Edinburgh	2.02

Francine² has analyzed the records of the Philadelphia General Hospital, which were not included in Howard's list.

¹ Medical News, October 8, 1904.

² American Journal of the Medical Sciences, March, 1905.

From January 1, 1893, to December 31, 1902, a period of ten years, there were roundly 40,000 admissions. Among these there were 42 gastric and 2 duodenal ulcers. When these figures are combined with those of Howard the clinical incidence of gastric ulcer in Philadelphia amounts to 0.15 per cent.

THE PATHOLOGICAL ANATOMY OF GASTRIC ULCER. Brooks¹ has analyzed 1000 consecutive autopsies in the Bellevue Hospital records, most of which were made by himself personally. He is much impressed by the fact that gastric ulcer appears to be much less frequent than he had supposed. Among these 1000 autopsies but 9 cases of gastric ulcer were found. Of 9 cases but 2 had been diagnosticated during life—a fact which also caused him much surprise, since all of these patients had been under the care of some of the best clinicians in New York.

In every fatal case in which a diagnosis of ulcer was made an ulcer was found at autopsy. This tends to show that our methods of detection of the milder grades of ulcer are imperfect, although it is fairly easy to diagnose the more severe forms.

It seems probable that a good proportion of gastric ulcers, perhaps one-half, are not recognized clinically.

Approaching the subject from its clinical side, Brooks found in 1366 consecutive cases gastric ulcer was diagnosticated in but 3. These observations force us to the conclusion that gastric ulcer is a rather rare disease, at least in a general hospital service.

In the Bellevue list, as a rule, the ulcers were single, but they were often multiple.

Brooks mentions a case belonging to Dr. Lusk in which gastric ulcer had been diagnosticated and operated upon before perforation was complete. The patient did well for several weeks, but died suddenly, evidently from peritonitis due to perforation. At autopsy a perforated ulcer of very recent formation was found some distance from the first point of the disease, and which had evidently formed since the operation. In Brooks' experience usually the ulcer has been found near the pylorus.

As a rule, the size of the acute ulcer in his list did not exceed that of a twenty-five-cent piece, and the size of the average ulcer was even smaller than a five-cent piece, which Einhorn mentions as the usual minimum size. He is convinced that small ulcers are the rule, but says that a matter of size is of relatively little importance, since the size varies very much as to whether the stomach is dilated or contracted.

There is no doubt but that a large number of small gastric ulcers heal without producing symptoms sufficiently marked to cause the patient to consult a physician. In these cases the ulceration probably

¹ Medical News, October 8, 1904

does not extend deeper than the submucosa, which heals by granulations springing up from the floor of the ulcer and producing a very small stellate scar. Brooks is inclined to think that there is never any glandular hyperplasia in such a process of healing, and he is inclined to think that many of the small white points of thickening which are often found postmortem in the mucous membrane of the stomach are really minute healed gastric ulcers. We are not justified in thinking, however, that all scars of the mucous membrane represent gastric ulcers, for many of them probably are simple scars formed after injuries of gastric mucosa or some kindred cause.

Brooks is strongly of the opinion that primary gastric cancer frequently arises in these healing gastric ulcers. He refers to 2 cases of this condition. Howard, on the other hand, believes that *ulcus carcinomatosum* is rare. The Johns Hopkins series contained only 4.8 per cent.

ETIOLOGY OF GASTRIC ULCER. *Chlorosis and Anæmia.* Wirsing¹ found very pronounced blood changes in all his cases. They were usually of the type of chlorosis and did not include cases of anæmia secondary to hemorrhage. It is very hard to demonstrate the part that anæmia plays in the etiology of ulcer, but in 57 of 190 cases there was a clear history of chlorosis for some time before the onset of gastric symptoms, indicating that the blood condition may have been a causal factor.

Howard,² in his analysis of 82 cases of gastric ulcer from the records of the Johns Hopkins Hospital, found that the hæmoglobin averaged 58 per cent, the red cells 4,071,000, and the white cells 7500. There was no material change in the number of white cells, and the Johns Hopkins Hospital experience with digestion leukocytosis was too limited to be conclusive, but in the cases in which such observations were made the increase in leukocytes after digestion was too slight to be of much value in the differential diagnosis.

Influence of Pressure and Trauma. Ackerman³ reports 12 cases of gastric ulcer in which the patient's occupation was of such a character that constant pressure was exerted upon the epigastrium. He also reports 1 case where a blow from the kick of a horse upon the epigastrium was followed in eighteen months by a gastric ulcer.

It is difficult to connect such physical conditions with the causation of gastric ulcer. Theoretically the interference with the circulation of the stomach due to pressure or insults to the mucous membrane from trauma would seem to favor the development of ulcer. Still, all shoemakers do not have ulcers, and we cannot regard either pressure or trauma as exclusive causes.

¹ Archiv. für Verdauungskrankheiten, 1905, Band xi., Heft 3.

² American Journal of the Medical Sciences, December, 1904.

³ Medical News, January 14, 1905.

Menstruation. It has been noted by several observers that gastric ulcers are unfavorably affected by the occurrence of the menstrual periods.

Wirsing has observed that a great many cases are admitted to the hospital during menstruation inferring an exacerbation of the symptoms and especially of pain during that time.

Pariser¹ orders his patients to stay in bed and upon liquid diet during each period for several months after an ulcer cure. Free gastric hemorrhage is often followed by cessation of menstruation.

Occasionally hæmatemesis seems to recur at the menstrual period, as observed by Kuttner in Ewald's clinic.

Wirsing cites an interesting case which had had typical symptoms of ulcer for three years with severe hæmatemesis and which had been treated in many hospitals without relief. She became pregnant and immediately all gastric symptoms left her and she has remained well ever since.

Influence of the Climacteric upon Ulcer. Borri² says that ulcer is frequent at the menopause, although there is nothing in literature to support his statement.

He reports 12 cases from Cohnheim's Polyclinic in Berlin, in all of which symptoms of ulcer began with cessation of menstruation. There may be some connection between the onset of gastric ulcer at this time and the circulatory disturbance of the climacteric.

Gastroptosis. It has been suggested that downward displacement of the stomach might be a predisposing cause for ulcer, for two reasons: first, interference with gastric circulation, and, second, because gastroptosis was formerly thought to be a cause of chlorosis.

This last idea is now discredited, for downward displacement and chlorosis almost certainly have no causal relation. It is possible that the disturbance of circulation that must always follow gastroptosis may favor the development of ulcer. Wirsing found this condition of the stomach in 25 or 8 per cent. of his 316 female cases of ulcer and probably the percentage was higher, as in cases of recent hemorrhage the stomach could not be examined by inflation.

I do not think that these figures are conclusive, for it has been my experience that, leaving ulcer out of the question, there would be at least 8 per cent. of cases of gastroptosis in any collection of women of the class from which Wirsing's patients were drawn (young household servants). The effect of gastroptosis upon the prognosis of ulcer appears much more definite. Thus, in Wirsing's 25 cases of downward displace-

¹ Discuss. Verhandlungen des Kongress f. inn. Med., 1902, p. 112.

² Zentralblatt f. innere Medizin, 1904, No. 27.

ment only 13 were cured, and of 8 heard from after three years only 2 remained well—a considerably worse outcome than in uncomplicated cases.

Valvular Heart Disease in Wirsing's experience did not appear to favor the development of ulcer or to hinder its recovery.

The Administration of Salicylic Acid has been held responsible for the development of gastric ulcer. Wirsing's list shows only 8 cases that took this drug and no connection could be traced between its use and the ulcer.

Syphilis did not appear as a cause of ulcer in any of Wirsing's cases, and specific disease was not more frequent than in other conditions. He refers to 2 cases with fatal hæmatemesis which was caused by syphilis of the liver—a condition which is important in its bearing upon diagnosis.

THE COURSE OF GASTRIC ULCER. In Wirsing's list the average duration of favorable cases was six months. A certain proportion of unfavorable cases ran a course of from one to five years.

He found that those patients who presented themselves for treatment early in the course of the disease had a much better chance of recovery. Thus, the average duration of the condition before treatment was instituted was one and one-half years in the cured cases and two and one-half years in those who were not improved.

THE GASTRIC CONTENTS IN ULCER. Contrary to the accepted rule of past years, that hyperacidity is an important sign of ulcer, Wirsing found that in more than half of 116 cases the amount of HCl was normal.

Ewald,¹ in a series of 132 cases, found even a smaller proportion of cases with hyperacidity.

Howard,² in 54 cases, found a greater percentage of cases with diminution of free HCl than either of the two preceding series.

The figures are as follows:

	Ewald.	Wirsing.	Howard
Subacidity, under 30	9.0%	1.8%	26.4%
Normal acidity, 30 to 60	56.8%	55.5%	26.4%
Hyperacidity, over 60	34.1%	42.7%	17.6%

Free acid was absent in 1 case of Howard's series.

If these observations are confirmed then hyperacidity loses much of its value as a diagnostic sign of ulcer. On the other hand, the presence of hypoacidity is a pretty sure indication that ulcer is not present.

It must be remembered that the Ewald test meal is a very mild stimulant to the gastric secretion, and under the influence of other foods the acid may increase to the point of hyperacidity. Several examinations

¹ Verhandlungen des Kongress f. innere Medizin, 1902, No. 35.

² Loc. cit.

with both the Ewald and Riegel meal should be made before hyperacidity is excluded.

The influence of an excess of acid upon the healing of the ulcer is interesting and important.

Wirsing put a series of ulcer cases upon the Lenhartz cure,¹ which is intended to neutralize the excess of acid and improve the nutrition. He found that the percentage of acid upon admission and discharge did not differ greatly (on an average only 8 points), but in those cases in which the acidity was not at all or only slightly diminished by the treatment, the proportion of cases was smaller and relapses were more frequent.

FEVER. In 58 of Wirsing's cases, or about half of those who had had recent hemorrhages, slight fever occurred for two to eight days after the vomiting of blood. No reason can be assigned for this phenomenon.

PAIN IN GASTRIC ULCER. The most constant symptom was pain within an hour after taking food. This was present in from 80 to 90 per cent. of all cases. Tenderness was noticed in 80 per cent., or 235 cases. The painful point was in the angle between the ensiform and the left border of the ribs in most of the cases (84 per cent.). It was further toward the left in 9 per cent., to the right in 4 per cent., and under the navel in 3 per cent. of cases.

The position of the pain in its relation to the position of the stomach is very interesting. In 8 cases of low-seated tenderness there were 5 instances of decided gastroptosis, while in the other 20 cases of gastroptosis a change in the position of the pain was not noted. That is, in downward displacement of the lesser curvature the pain of ulcer was localized, not where the upper border of the stomach was, but where it ought to have been. This observation is explained by Roux, by assuming that the pain is referred not to the seat of the ulcer, but to what he calls the point epigastrique in the solar plexus.

The painful points in the back were present in almost half of Wirsing's cases.

Pain when lying upon the side was noted in 121 cases (about one-third), on the left side oftener than upon the right.

DIFFERENTIAL DIAGNOSIS OF ULCER. It is often quite impossible to distinguish an ulcer from the different forms of gastralgia of nervous origin, especially when the latter condition is associated, as it often is, with hyperacidity. The diagnosis is complicated by the fact that such functional disturbances are not infrequently followed by the development of true ulcer.

¹ PROGRESSIVE MEDICINE, December, 1904, p. 30.

Since sudden and unlooked-for hemorrhage and perforation are the dangers of such uncertain cases it is safest to put all doubtful cases upon an ulcer cure, which is as good treatment for one as for the other.

Wirsing's list included 4 cases of reflex or toxic gastralgias which were admitted with the diagnosis of ulcer and showed all the cardinal symptoms except hemorrhage, but which promptly recovered after the removal of a tape-worm.

OTHER CONDITIONS GIVING RISE TO GASTRIC HEMORRHAGE. *Malaria.* Scozzari¹ reports the case of a civil engineer from a malarious region who had very frequent hemorrhages from the stomach and intestines during his malarial attacks.

Influenza. Hubermann² records a fatal gastric hemorrhage during an attack of influenza, in which autopsy showed an acute inflammation of the gastric mucous membrane with erosions, but without a true gastric ulcer.

LEFT-SIDED STOMACH PAIN A SIGN OF GASTRIC ULCER. Riedel³ lays great stress upon left-sided stomach pain as a sign of organic gastric disease, especially ulcer.

The reason of the left-sided position of the pain is that almost all ulcers are situated in the portion of the stomach that lies to the left of the median line. Only the pylorus lies to the right and the antrum pylori is directly in the middle.

Ulcers in the last-mentioned portions of the stomach would give rise to pain and tenderness to the right or in the median line and are exceedingly hard to differentiate from cholecystitis. If the ulcer has produced pyloric obstruction and secondary dilatation, or if there is pronounced enlargement of the gall-bladder, the diagnosis is comparatively easy, but unfortunately these conditions are presented only in a certain part of the cases.

Pain from a centrally situated ulcer might be confused with referred pain in appendicitis or hernia of the linea alba.

Thus it will be seen that a reflex pain and pain referred to the stomach from lesions of other organs are almost invariably right-sided. Organic disease (especially ulcer) of the pylorus and antrum will also give right-sided or median pain, but these two portions of the stomach are not as frequently affected as the lesser curvature and the stomach wall adjacent to it. All of this portion of the organ lies to the left.

Left-sided Tumor in Gastric Ulcer. Another condition that sometimes helps to bring the pain farther to the left than its real position

¹ Gazzetta degli ospedali, 1905, vol. xxiv., No. 145.

² Chirurgia, 1904, vol. xv., No. 87.

³ Münchener med. Wochenschrift, 1905, Bd. lii., No. 17.

would indicate is the tendency for ulcers to adhere to neighboring structures, especially the parietal wall, liver, and pancreas, and to be drawn farther to the left by the contractions of the adhesions. This gravitation toward the left is helped by the formation of tumors which arise around the ulcers and their adhesions.

These tumors are of different sizes and are very apt to come when the ulcer penetrates through the mucous membrane and muscularis and reaches the serosa. They may be formed by true changes in the stomach wall, or because the floor of the ulcer becomes adherent to some neighboring organ. The latter is by far the most common method of origin. Still, Riedel has seen four cases of large walnut-shaped tumors which were produced by thickening in the muscularis and serosa in the neighborhood of an ulcer. This tendency to tumor formation through changes in the stomach wall is least common in pyloric ulcer, so that a tumor to the right is rare. The ulcers of the lesser curvature and of the anterior and posterior abdominal wall to the left of the median line have a much greater tendency toward tumor formation.

The ulcers of the posterior wall very often adhere to the pancreas and those of the anterior wall to the left lobe of the liver.

When the left lobe of the liver becomes adherent to an ulcer of the anterior wall the spread of the inflammatory process produces a perihepatitis which involves the parietal wall and the rectus muscle on the left side. Then the ulcer is drawn over toward the left costal margin and a clearly defined and easily palpated tumor is formed which is not affected by respiration. The tumors formed by the growing fast of the ulcer to the posterior and middle stomach wall oftener sink far to the left of the median line. They may be confused with carcinoma of the pylorus which, while usually felt in the right or in the median line, may be on the left when the liver is large and occupies the whole of the right upper quadrant.

From what has been said it will be seen that almost all ulcers of the middle portion of the stomach move toward the left to an extent which is proportionate to the size of the tumor that forms around them.

In such cases the pylorus is usually near the median line, since it is pulled over toward the left by the traction of the tumor.

This tendency of ulcer tumors to move toward the left is most pronounced when the shape of the stomach has not been changed by the ulcer. The cicatrization of ulcers can distort the stomach in a great many different ways, such as drawing the pylorus toward the cardia when the ulcer is in the lesser curvature or in the formation of an hour-glass stomach. As a result of this distortion an ulcer tumor that was originally to the left of the median line may be dragged over toward the right. Yet in 28 cases under Riedel's observation, only one, a right-

sided tumor, occurred, and even then there was a long antecedent history of left-sided pain.

The tumor formed by the adhesion of an ulcer of the anterior wall to the left lobe of the liver is naturally rather easily demonstrated and can be detected even when it is still quite small. It manifests its presence by a resistance at first indefinite and later more pronounced under the left border of the ribs 2 or 3 cm. from the middle line. In thin people the left lobe of the liver becomes very prominent.

On the other hand, tumors arising from the adhesion of an ulcer of the posterior wall to the pancreas must reach a considerable size before they can be palpated through the anterior abdominal wall. The reason of this is their deep position, and the rigidity of the recti that is usually present from the pain. They are more readily palpable in women than in men, and with the stomach empty. However, under the best circumstances their detection is very uncertain, and sometimes they can be made out and not at all at other times. After they attain a considerable size they become quite evident. But long before the tumor is palpable the left-sided pain is very pronounced, referred to a point under the left costal margin.

Ulcers of the middle portion of the stomach should be diagnosed early, before an hour-glass deformity occurs. This should not be difficult if the presence of left-sided pain is given its true value. Its significance is greater because reflex pain almost never occurs to the left, while right-sided pain is not so certain in its indication of ulcer, because of the frequency with which referred or transmitted pain occurs upon or to the right of the middle line.

When left-sided pain is constant, remains in one spot, is greater after eating, and is accompanied by vomiting, its presence is conclusive evidence of the presence of an ulcer.

Sources of Pain Referred to the Stomach and Not of Gastric Origin. The conditions outside the stomach that may give rise to pain referred to the epigastrium or upper abdomen may be classified as follows:

A. Reflex causes.

B. Lesions of neighboring organs.

It will be seen that in all these conditions, with the rare exception of splenic abscess, the pain is in the median line or to the right of it.

A. *Reflex Causes.* 1. A rapidly developing appendicitis. Almost a third of such cases gives the history of onset of pain in the epigastrium followed by vomiting. A few hours later the pain moves down to the right lower quadrant, unless it remains around the navel in cases where the appendix lies in the pelvis.

2. Hernia of the linea alba often gives pain referred to the stomach.

3. Free epiploic appendages in the peritoneal cavity which have been

separated by torsion. These may be loose or adherent to the gut or omentum. In either position they produce more or less severe stomach pain, often without general disturbance of the patient.

B. Lesions of Neighboring Organs. 1. Acute inflammation of the gall-bladder usually produced by gallstones. Riedel makes the remark, which his great experience makes very significant, that 90 per cent. of all cases of cramp in the epigastrium are due to gallstones. The absence of jaundice in a great many cases of acute cholecystitis complicates the diagnosis.

2. Adhesions between the gall-bladder and liver, or between the duodenum and pylorus, very often produces pain referred to the pylorus.

3. A right-sided floating kidney adherent to the spinal column may simulate right-sided stomach pain.

4. In fat necrosis the pain depends upon the position of the inflamed tumors, and is sometimes in the middle line and may be on the left.

5. Abscess of the spleen may produce left-sided gastric pain, but this is rare.

6. Large duodenal ulcers adherent to the liver wall will cause right-sided pain. If such an ulcer is not adherent the pain is referred to the median line just above the navel.

Orthoform in Gastric Ulcer. Two years ago Murdoch¹ called attention to the possibilities of using orthoform in the diagnosis of gastric ulcer. The test is based upon the fact that orthoform will quickly dull the sensibility of the sensory nerves in ulcer of the mucous membrane, but has no effect on sensation when the mucous membrane remains intact. Murdoch administers the drug in doses of 8 grains, and finds that in cases of true ulcer the pain ceases within half an hour, but in gastralgia, neurosis, and pains from other conditions no such result is obtained.

TREATMENT OF GASTRIC ULCER. The Lenhartz² treatment of ulcer is growing in favor. The objections to it that I ventured to suggest in *PROGRESSIVE MEDICINE* last year do not appear to be warranted.

Ewald speaks of it with considerable favor, and references to the benefits derived from the method are becoming frequent in literature. Wirsing³ has contrasted the results obtained by the use of the Leube treatment (rectal feeding, milk, and rest) in 320 cases with the Lenhartz method, which he has employed in 42 patients. The comparison shows that in cases without recent hemorrhage the percentage of ultimate cures is higher with the Leube method than with that of Lenhartz, while in cases with fresh bleeding the Lenhartz diet gives distinctly better results.

¹ Medical News, October 8, 1904.

² *PROGRESSIVE MEDICINE*, December, 1904, p. 30.

³ Loc. cit.

The reason why there are more relapses after a Lenhartz cure may be that the patients feel stronger and more energetic in convalescence after the more nourishing diet and consequently they are more apt to grow careless and allow themselves lapses in *régime* which favor renewed ulceration. After a Leube cure, on the other hand, the return to the normal condition is more gradual and without the temptation to self-indulgence.

Wirsing explains the apparent paradox that the heavier diet gives the best results with freshly bleeding ulcers by supposing that in cases without hemorrhage the Leube or milk diet offers less irritation to the ulcer, which heals more quickly than under the heavier diet, because general nutrition is not so much reduced as to seriously affect the healing. On the other hand, in bleeding ulcers the loss of blood has so lowered nutrition and hæmoglobin that these conditions are more serious drawbacks to healing than the irritation of the Lenhartz diet; consequently, although this method is a greater strain upon the digestion and more irritant to the ulcer, the general nutrition is so improved that healing takes place in spite of the local irritation.

Wirsing says that the benefit derived in bleeding ulcers is the most valuable part of the treatment, and he of late has reserved the Lenhartz method for bleeding cases and treats cases without hemorrhage by the Leube system as before.

He never found that the tendency to bleeding was increased by the diet.

In view of the recent progress made in the treatment of gastric ulcer by surgery it is interesting to see that such a high authority as Prof. Riedel, himself a surgeon, says that, as a rule, all medical methods of treatment should be proven useless before operation is resorted to.

Olive Oil in the Treatment of Gastrointestinal Diseases. The use of large doses of olive oil has been strongly recommended in irritative conditions of the stomach and duodenum, such as ulcer, spastic and organic pyloric stenosis, hypersecretion, hyperacidity, and the pain that occurs in an empty stomach, both in hypochlorhydria and achylia. Perhaps Cohnheim has been the most enthusiastic of the advocates of this mode of treatment. His methods of administration were given in *PROGRESSIVE MEDICINE*, December, 1904, p. 36.

Otto Blum¹ gives his experience with the remedy during the past year in Ewald's clinic in Berlin. He quotes Ewald to the effect that in his experience oil has not given wholly satisfactory results and Blum's own experience leads him to much the same conclusion, and fails to support Cohnheim's claims. Blum has tried the oil as Cohnheim directed upon

¹ Berliner klin. Wochenschrift, 1905, Bd. xlii., No. 20.

18 cases of hyperacidity, hypersecretion, dilatation, chronic gastric ulcer, duodenal ulcer, and stenosis of the pylorus. Blum suggests that many of the cases of pain that were relieved by the oil in Cohnheim's list were really instances of pain due to hyperæsthesia of the gastric mucous membrane in cases of hyperacidity and were not gastric ulcers or erosions as Cohnheim assumed. I think this point is well taken and agree further with Blum that it is absolutely impossible to make a certain diagnosis of gastric erosions during life, a condition that Cohnheim claimed was much benefited by olive oil. Blum's conclusions are as follows: (1) He found that in general the oil was not liked or well tolerated, especially in the large doses recommended by Cohnheim. Much smaller doses seemed to achieve equally good results in favorable cases and were not nearly as likely to be followed by the nausea, vomiting, and loss of appetite that the larger doses caused. Even then the majority of patients either would not or could not take it. However, in a certain number of persons the oil caused no disturbance and certainly was of benefit. (2) In cases of hyperacidity with or without hypersecretion the oil inhibited HCl secretion and was of decided benefit in reducing gastric discomfort. Moreover, it regulated the bowel and helped nutrition. Whether or not this good effect was permanent could not be determined. Ulcers of the stomach and duodenum were not benefited, and in a few cases in which the oil was used hemorrhage followed promptly. Probably, however, the occurrence of bleeding was only a coincidence, as it is hard to see how oil could produce this result. Further, in high-grade pyloric stenosis and in decided gastric dilatation from any cause the oil is contraindicated because it is retained in the stomach and, becoming rancid, acts as an irritant. In none of Blum's cases did it seem to make the pylorus more patulous. In one undoubted case of pylorospasm, a condition in which Cohnheim claimed that the oil was almost a specific, it had no effect. The oil should be absolutely fresh, and Blum is frank enough to say that in some of the cases where its administration caused disagreeable results the oil that he used may not have been entirely good. I have used the remedy in several cases of malnutrition with irritated conditions of the gastrointestinal tract. In none of them did the oil seem disagreeable to my patients, while in one case at least it proved to be of the greatest benefit in a man with chronic diarrhœa. Examination of the stools showed imperfect meat digestion, and very good carbohydrate and fat digestion. He was given a diet consisting of carbohydrates, a very little meat, and a half-ounce of oil after each meal. His diarrhœa disappeared and he gained twenty pounds. I have found the most satisfactory way to give the olive oil is in milk after meals. The usual dose is two teaspoonfuls, increasing to a half-ounce in a third of a glass of milk three times a day.

Hyperæsthesia of the Gastric Mucous Membrane. Increasing emphasis is being laid upon the fact that hyperacidity—that is, a high percentage of HCl in the gastric contents—does not of itself cause unpleasant symptoms. It is a well-known fact that the secretion of HCl may be far in excess of what we consider its normal limit without the slightest discomfort to the patient or symptoms referable to the stomach.

Von Noorden¹ cites three cases and refers to many more in which hyperacidity was demonstrated in cases of neurasthenia without gastric symptoms.

To produce pain and dyspepsia there must be added a peculiar disturbance of the nervous mechanism of the stomach causing a hyper-sensitiveness of the gastric mucous membrane. Personally, I am of the opinion that this hyperæsthesia or sensory neurosis is the more important factor in the production of the symptoms usually referred to as those of hyperacidity—namely, pain and irritation coming on at the height of digestion and relieved by alkalies or more food. I believe this because many times patients will present themselves with exactly this history, including relief upon taking albumin and alkalies, in which repeated examination of gastric secretion shows a normal or even a subacidity.

The lining of the stomach in these cases has become so sensitive that normal or even subnormal amounts of HCl will produce the same degree of irritation as excessive quantities of free acid in less irritable stomachs. This observation is in no sense a new one, but is well recognized by everyone who has to do with gastric disturbances.

However, I wish to call especial attention to this hyperæsthesia of the gastric mucous membrane, because I believe it to be of more importance in the production of the symptom-complex usually spoken of as hyperacidity than is the excessive secretion of HCl itself.

The amount of pain and irritation appears to be more dependent upon the degree of hyperæsthesia than the amount of acid secreted.

The condition is evidently a sensory neurosis of the stomach, arising in the same conditions that produce the secretory neurosis.

The recognition of the importance of this element of hyperæsthesia in cases of hyperacidity does not modify the treatment. Even if the acid is normal or subnormal it must be neutralized by alkalies after the height of digestion and a bland proteid diet with good amounts of easily digested fats is indicated.

The condition that gives rise to the neurosis must be removed as far as possible by rest and by increasing nutrition, and it has been my experience that mild sedatives, as bromides, valerianate of zinc or chloral in small doses are valuable in the early stages of the treatment. In

¹ Zeitschrift f. klin. Med., 1904, Bd. liii.

cases without excessive HCl the alkaline treatment must be stopped as soon as the pain and irritation are relieved, so that gastric digestion may not be interfered with.

Hyperacidity and Constipation. In at least two-thirds of von Noorden's cases of functional hyperacidity there were cases of constipation found of such a degree that months passed without a spontaneous movement. It is often an extremely difficult point to decide in such cases whether hyperacidity or constipation is the primary condition. Probably in most instances hyperacid dyspepsia was primary and was followed by intestinal dyspepsia and constipation. However this may be, it has been the experience of von Noorden that dietetic treatment of constipation almost invariably benefits hyperacid dyspepsia and even the hyperacidity itself, so that as the stools became normal the percentage of free acid fell in proportion. The probable explanation of this is that there is a vicious circle established, and when this is broken improvement occurs in the primary as well as in the secondary morbid state, as is so often the case in such a condition. It is probable that no causal relationship exists between the two conditions, since hyperacidity may exist without constipation, while the contrary is also true, that constipation is not always followed by hyperacidity.

HYPERACIDITY AND MALNUTRITION. Cases of hyperacid dyspepsia are almost always badly nourished. The malnutrition may have preceded the appearance of gastric symptoms, or may have apparently been the result of the gastric disturbance.

Von Noorden is very strongly of the opinion that the state of the general nutrition has the most profound effect upon the course of the hyperacid dyspepsia in such cases. He does not go so far as to say that malnutrition is a primary condition, for there are many well-marked exceptions that would controvert such a statement. However, here also there is a vicious circle, and when this is broken the improvement in the hyperacid dyspepsia is most pronounced.

A course of treatment directed toward increasing the general nutrition and body weight is almost invariably followed by the disappearance of the gastric symptoms. The hyperacidity itself sometimes improves at the same time, but it cannot be said that this is always the case. However, the acid dyspepsia disappears, and if the excessive secretion of acid persists it is without symptoms.

Of course, the fact must not be overlooked that many cases of hyperacid dyspepsia are well or even overnourished, and then naturally other therapeutic measures are indicated. Measures directed toward increasing body weight are indicated in every variety of hyperacid dyspepsia with malnutrition.

This applies not only to cases of hyperacid dyspepsia in badly nourished

neurasthenics, but to the other severer forms of acid catarrh as well. Naturally, however, the results here are much more uncertain, and the dietetic treatment of such cases must often be combined with intelligent use of various other remedies, such as lavage and drugs.

In the treatment of ulcers von Noorden gives an unqualified approval of the Lenhartz method, referred to in my article in *PROGRESSIVE MEDICINE* for last year.

Von Noorden, however, does not go quite as far as Lenhartz in the first ten days of treatment. During this period the diet is very limited in amount and character, but at the end of this time the food is rapidly increased so that during the second week the patient gets from 3500 to 4500 calories, and in the six weeks of an ulcer cure the patient will often gain from ten to fifteen pounds.

The value of the dietetic treatment may be summed up as follows: In cases of nervous hyperacid dyspepsia with great malnutrition a gain in weight is generally followed by entire relief and no other therapeutic measures are required.

In acid catarrh and ulcer with bad nutrition, measures directed to increasing body weight are a very important part of the treatment, but must be combined with other remedies before relief can be obtained.

Syphilis of the Stomach. This condition until recent years has had very little attention paid to it. The manifestations of syphilis in the stomach varies in the symptoms which it produces, and this renders the diagnosis during life very difficult and often impracticable except by the therapeutic test. Since Einhorn first classified the literature upon the subject there have been a few isolated cases reported. (See Lafleur's case, *PROGRESSIVE MEDICINE*, December, 1904.) Charles F. Hoover¹ reports three cases which were presumably syphilis. The diagnosis in all rested upon the fact that indefinite gastric symptoms in the syphilitic subjects were benefited by potassium iodide. In two cases the only symptoms referable directly to the stomach were pain and vomiting after food. Nothing abnormal could be detected on physical examination so far as the stomach itself is concerned. In the third case the stomach was considerably dilated. There was retention of chyme, periodic vomiting, but no tumor nor areas of tenderness could be detected. In each case the symptoms were removed by the administration of potassium iodide, and in every case they recurred to be again benefited by the use of the same drug. In the third case death ensued in one of the relapses before relief could be obtained. It is probable that the lesion in the last case was a gumma pressing upon the pylorus.

¹ Cleveland Medical Journal, September, 1904, vol. iii.

The Stomach Function in Tuberculosis. It is generally known that functional disorders of gastric digestion are a frequent manifestation of the early stages of tuberculosis of the lungs. Indeed, the stomach symptoms are often more prominent than those referred to the lung, and have many times led to errors in diagnosis. These digestive disturbances in early phthisis are probably toxic in origin and arise from an impression made upon the nervous mechanism of the stomach.

Munson¹ examined the stomach in 26 cases of pulmonary tuberculosis and discovered a general tendency toward a diminution in the secretion of HCl. The pepsin was affected to a less degree, while motility was normal. The first group of Munson's cases (10 cases) embraced those in which the disease of the lung had not existed for longer than nine months. In eight of these patients there was a history of stomach trouble which in some cases antedated the lung condition and in others developed simultaneously with it. Hydrochloric acid was diminished four times and absent once, while peptic digestion was unchanged.

In the second group, including 11 more advanced cases, HCl was absent in 3 and diminished in all. In 5 cases in the later stages of the disease free acid was absent or diminished four times. Here peptic digestion was also diminished.

Tuberculosis of the Stomach. Primary tuberculosis of the stomach is extremely rare. There appear to be but 3 well-substantiated cases on record. The last of these was reported by Ruge² quite recently. The patient was a man, aged fifty years.

At autopsy the pathological diagnosis made upon the gross appearance of the organs was as follows: Carcinoma of the stomach with metastasis in the ribs and abdominal lymph glands, pleuritis, and carcinomatous peritonitis. However, microscopic examination showed that the supposed carcinoma was really tuberculosis. The process seemed to originate in the stomach and was apparently primary there. The form of the disease, especially in the serous membranes, resembled the new-growths of pearl disease in cattle, and this suggested the possibility that the infection may have been from the drinking of milk.

Diaphragmatic Hernia of the Stomach. Knaggs³ has collected 63 cases, including 3 of his own: 20 were congenital, 21 traumatic, and 12 acquired in other ways. In this last group the hernia took place through one of the natural openings in the diaphragm, especially that through which the œsophagus passes, by the separation of the muscle bundles. The hernia of the stomach may be complete or incomplete and the sac may even contain parts of other viscera. The symptoms were various

¹ New York Medical Journal, March 18, 1905.

² Beiträge zur Klinik der Tuberculose, Bd. iii., part iii.

³ Lancet, August 6, 1904.

and irregular, but usually consisted of disturbance of respiration, and digestion and signs of obstruction and strangulation, and especially tetany. The physical signs are often indefinite. The presence of stomach and intestinal murmurs in the thorax and displacement of the heart are symptoms of much diagnostic importance. A murmur can often be elicited by pressing the air through the contracted portion of the stomach. Other signs are the disturbance of pulmonary murmur and resonance, the alteration in the shape of the thorax, the sunken epigastrium and inability to lie upon the right side.

The lesions found at autopsy were adhesions, chronic ulcer, dilatation, perforation and strangulation of the stomach, and obstruction caused by volvulus of the stomach or torsion of the lesser omentum.

Acute Dilatation of the Stomach. Hoffmann¹ reports a case which demonstrates that acute and fatal dilatation of the stomach may occur with very little warning and apparently from very slight causes.

The most important symptoms of its onset are uncontrollable vomiting associated with dulness in the left half of the abdomen and the information derived by the use of the stomach tube.

He is of the opinion that acute dilatation never occurs in an entirely healthy stomach, but that there must be some condition favoring its development. This is oftenest atony associated with a slight degree of dilatation. Under such circumstances a slight error in diet, often so trifling as to make it very difficult to determine what it really was, is all that is needed to produce extreme dilatation with stagnation of food, especially of fluids; consequently great thirst and suppression of urine are prominent symptoms of the condition.

An interesting feature of the case that Hoffmann reports was the enlargement of the head of the pancreas, which was thickened and harder than normal. In the microscopic examination small islands of necrosis were found scattered through the organ.

Gastric Contents in Lead Poisoning. Sailer and Speese² have studied the gastric contents of a series of 12 cases of acute and chronic lead poisoning in the Philadelphia General Hospital, and find that the secretion of HCl and pepsin was decidedly affected. Their results were quite uniform and therefore seem conclusive, although their series of cases was small. Free HCl was absent in every case with an average total acidity of 11. Lactic acid was present in every case and Oppler-Boas bacilli were not found.

The peptic digestion was absent in 3 cases and reduced in the rest. In 6 of 7 cases basic degeneration of the leukocytes was found.

¹ Münchener med. Wochenschrift, 1904, Bd. li., No. 45.

² Journal of the American Medical Association, May 13, 1905.

Sailer remarks that medical literature is curiously silent as to gastric digestion in lead poisoning. This is remarkable, since abdominal symptoms are usually very prominent in that condition. The mechanism of the alteration of secretion is not clear. Whether it is a functional disturbance or whether there is some structural alteration is not known, since there has never been any systematic investigation of the gastric mucous membrane of fatal cases.

Suppression of HCl Secretion in Malignant Disease of Other Organs Besides the Stomach. The reason for the suppression of HCl secretion in the stomach in cancer of that organ is a problem that has interested many observers; while HCl is not invariably absent in carcinoma ventriculi, still its presence is exceptional, its absence is constant enough to serve as strong evidence of malignant disease in a differential diagnosis.

The different theories that have been advanced to explain the achlorhydria of cancer of the stomach were fully considered in *PROGRESSIVE MEDICINE*, December, 1903 (p. 30). No reference need be made to the subject here further than to say that no explanation has been advanced as yet which satisfactorily covers all cases. Now, Benjamin Moore, Professor of Biochemistry in the University of Liverpool,¹ has made several interesting observations that throw a new light upon the achlorhydria of cancer.

His study of seventeen cases of cancer not of the stomach but of almost every other portion of the body appears to show that the absence of hydrochloric acid in carcinoma ventriculi is not due to local action in the stomach, for hydrochloric acid is absent or reduced greatly in amount whatever may be the situation in the body of the malignant growth.

The examinations were made after an Ewald breakfast in cases of malignant disease of the uterus, mamma, prostate, rectum, tongue, cheek, mouth, etc.

In two-thirds of the cases free HCl was entirely absent, while in the remaining third the amount secreted was much below the normal, being reduced to a mere trace in all except one case.

This work of Moore and his associates puts a new aspect upon the gastric chemistry in cancer. His observation is an extremely important one, and if it is substantiated by subsequent experiments, it will force us to revise our methods of diagnosis in cancer of the stomach.

His work was very thorough and painstaking, and each analysis was controlled by most of the known tests for hydrochloric acid free and combined.

¹ *Lancet*, 1905, i. p. 1121.

Moore attempts some explanation of the suppression of HCl secretion based upon the theory that depression of the concentration of the hydrogen ions of the plasma would interfere with HCl secretion.

THE INTESTINES.

Clinical Examination of the Stools. If we consider the progress made in the study of diseases of the intestines in recent times we must be impressed with the great lack of accuracy and comprehensiveness in our knowledge of intestinal pathology. Appendicitis, intestinal obstruction, and some of the more severe inflammatory conditions of the bowel itself form the sum total of the well-known intestinal diseases.

We know absolutely nothing of the pathology of lighter grades of inflammation or of the functional changes in which no anatomical lesion can be found by our methods of examination. Recent investigation into intestinal digestion, such as the discovery of the enzymes of the succus entericus and their close relation to pancreatic secretion, and our growing knowledge of the part of digestion performed by the secretions of the liver and pancreas, unfortunately tend rather to confuse than to make it easier to formulate accurate methods of clinical research. This is because certain changes in the feces, such as abnormalities in the digestion of fats, starches, and meat fibre may be produced by disturbance in any one of several different secretions or organs.

A very good example of this is found in the significance of unchanged muscle fibre in the stool. It may be undigested either because pancreatic secretion is imperfect or because intestinal secretion does not furnish the "activating enzyme," enterokinase, needed for the activity of pancreatic digestion, or, thirdly, because peristalsis is increased so that the food was swept through before digestion could take place.

We need a clinical method of diagnosis of intestinal disease and also, not less important, a method of determining how perfectly food is being digested and absorbed, and, in case either of these functions is disturbed, where the fault lies; in other words, a method by which we can regulate the diet of our patients by knowing definitely how perfectly different articles of food are digested.

Physiological chemistry offers the best solution for the problem of regulation of diet, but it is not well suited for routine clinical work because it is not rapid enough to enable us to watch a good number of patients at once. Besides, such methods are beyond the reach of all but trained chemists or those able to command the resources of such a laboratory. On the whole the method suggested by Adolph Schmidt, of Dresden,¹

¹ Die Funktionsprüfung des Darmes mittels der Probekost, etc., Wiesbaden, 1904.

best fulfils the requirements of clinical methods for diagnosis of disease and regulation of diet. However, as I have said, the complexity of the digestive processes in the intestine is so great that any method founded upon the examination of the feces alone must at best be very imperfect.

I have tested his method in my own work and found it of great help in certain cases, and so venture to present it somewhat in full to the readers of *PROGRESSIVE MEDICINE*.

Schmidt demands two conditions for a satisfactory clinical method of examination of the feces.

1. A knowledge of what a normal stool should be under a certain diet involving the use of a "test diet."

2. The methods of examination must be as simple as possible so as to be within the reach of everybody. The examination proposed by him can be readily completed in ten minutes if one is well practised in the various steps.

1. The test diet. The requirements are:

- (a) That it must be nutritious enough to furnish calories sufficient for the body's needs.

- (b) It must be so constituted that it can be obtained in any household or hospital dietary.

- (c) It must contain a constant amount of certain articles so that variation in digestion and absorption can be detected in the stool.

Schmidt suggests the following diet, which has been slightly modified by many different observers, but which remains the basis of all "normal or test diets:" 1.5 litres milk, 100 gm. zweiback, 2 eggs, 50 gm. butter, 125 gm. very rare or raw beef, 190 gm. potatoes, and gruel from 60 gm. of oatmeal, and 20 gm. sugar.

In my own work I have translated this into American terms suited to a hospital or private kitchen as follows: 3 pints milk, 6 pieces well-dried toast, 2 to 4 eggs, $1\frac{1}{2}$ oz. butter, $\frac{1}{2}$ pound tender rare steak, 6 oz. mashed boiled white potato, and gruel made from $2\frac{1}{2}$ oz. of ordinary oatmeal, $\frac{1}{2}$ oz. sugar. This may be given somewhat as follows:

Breakfast: 2 eggs, $\frac{1}{3}$ of the amount of toast and butter, 2 glasses of milk, oatmeal, milk and sugar.

Dinner: The steak and potatoes, $\frac{1}{3}$ of the amount of toast and butter, $1\frac{1}{2}$ glasses milk.

Supper: 2 glasses milk, remainder of toast and butter, 1 or 2 eggs if desired.

This diet is not enthusiastically received by the average patient who is not seriously ill, because of its limitations in amount of food allowed; however, it has the advantage of being suitable for almost any gastrointestinal case, and, moreover, is only given for a period of two or three

days. A capsule containing 5 grains of carmine or charcoal is given with the first meal and no examination is made until a red (or black) stool appears.

The amounts of each article given must be measured accurately at first, and then when the number of slices of toast, quantity of cooked oatmeal, etc., is fixed in the attendant's mind each article need not be weighed at each meal. This does not apply to the meat and potatoes, which should be weighed every day.

The period of time required for the passage of food through the gastrointestinal canal is of importance and can be easily determined by watching for the first red stool. The significance of this "period of passage" is considered below.

The examination of the stool consists of the following steps: The consistency, color, and smell must be observed. Then a piece of formed stool as big as an English walnut or an approximately equivalent amount of liquid feces is rubbed up in a mortar with distilled water until it is quite smooth and liquid.

Part of this is poured into a large Petri dish or upon a glass plate and examined in a good light and over a dark background. I have found the Petri dish a very great convenience in this part of the examination, as its sides prevent the material from spilling. A little experience will enable the observer to acquire a surprising amount of information about the composition of the stools by this macroscopic examination alone.

In normal digestion very little should be seen by the naked eye except small brown points (oatmeal or cocoa hulls) and occasionally sago-like grains that look like mucus, but which the microscope shows to be grains of potato.

Pathologically there may be: 1. Mucus in large or small flakes which is not affected by rubbing in the mortar. The smaller the flakes the harder it is to recognize them, but in my experience, which agrees with that of Schmidt, none are so small as to escape detection if the stool is examined in the manner described. The mucus appears as glassy, translucent flakes, often stained yellow by bile pigment. Doubtful cases can be decided by the microscope.

2. Pus, blood, parasites, stones, and foreign bodies that do not call for especial comment.

3. Remnants of connective tissue and sinew from the beefsteak. These can be detected by their whitish-yellow color and their toughness, by which they can be distinguished from mucus.

In case of doubt a piece should be examined microscopically with a drop of acetic acid. Connective tissue then loses its fibrous structure, while mucus becomes more thread-like.

Small single pieces of connective tissue can be found in normal stools,

but when they are numerous and large their presence indicates decided impairment of gastric digestion.

4. Remnants of muscle fibre. These appear as small, reddish-brown threads or small, irregular lumps. When they can be easily recognized by the naked eye and are quite numerous it shows impaired intestinal digestion.

5. Remnants of potato. As was said, these look like grains of boiled tapioca and may be easily confused with mucus. The microscope will show the true nature of the bodies.

6. Large crystals of acid phosphate of ammonia and magnesia. These occur in foul stools and can be recognized by their shape and chemical reaction (solubility in all acids).

The *microscopic* examinations confirms the naked-eye inspection. Three slides are prepared from the liquid feces. The first is merely a drop of the material to be examined under high and low powers. The second slide is prepared by mixing a drop of material with a drop of acetic acid (U. S. P.), heating it to boiling, and then putting on a cover-glass. The third is a drop of material with a drop of weak Lugol solution (iodine 1, potassium iodide 2, water 50).

Normal Stool. The first slide will show:

(a) Single small muscle fibre, colored yellow, usually with the cross-striation. Visible with Leitz 3, but showing better with Leitz 5, Oc. 3.

(b) Small and large yellow crystals of salts of fatty acid.

(c) Colorless (gray) particles of soap.

(d) Single potato cells, without distinguishable contents.

(e) Particles of oatmeal and cocoa shells.

In the second slide a general idea can be obtained of the fat contents of the stool.

Upon cooling, small flakes of fat acids can be seen over the whole preparation. The large crystals of salts of the fatty acid and the soap are broken up by the acetic acid and the fat acids are liberated. If the slide is heated again and examined hot the fat acids will be seen to run together in drops, which, as the slide cools, break suddenly apart.

In the third slide there should be violet-blue grains in some of the potato cells and small, single, blue points, probably fungi spores.

Pathologically there may be:

I. slide.

(a) Muscle fibre in excess, perhaps with yellow nuclei.

(b) Neutral fat drops or fatty acids in crystals.

(c) An excess of potato cells, with more or less well-preserved contents.

(d) Parasite eggs, mucus, connective tissue, pus, etc.

II. slide. Fat acid flakes in excess.

III. slide. Blue starch grains in the potato cells or free oatmeal cells, fungus spores or mycelia.

The Chemical Examination. This comprises only three routine tests, with a possible fourth. They are the reaction, sublimate test for the condition of the bile salts, the fermentation test, and, perhaps, the estimation of the "lost" albumin.

The reaction of the stool, which is quite difficult to get by the use of litmus paper, can be very easily determined by dropping a little softened fecal matter into 5 or 10 c.c. of a weak, watery solution of litmus, shaking it and noticing the change.

The sublimate test consists in taking a few cubic centimetres of the liquid feces and mixing it with an equal amount of 25 per cent. watery solution of HgCl_2 . A normal stool will quickly turn a pinkish-red, indicating the presence of hydrobilirubin, which will be the more intense the fresher the material. A green color, even if it is detected microscopically, is pathological and indicates unchanged bile pigment.

The Fermentation Tests. The apparatus used is described in the illustration. My own modification follows very closely Strasburger's instrument, but is more easily made and repaired. (See Fig. 3.)

About 5 gm. of fresh-formed feces is taken or an equivalent amount of thinner material. (See Koziczowsky's table below.) This is rubbed up with sterile water and poured into the main bottle *a*. This is filled with sterile water; tube *b* is filled with water and fitted in place (not necessarily entirely full) and tube *c* is then fitted on (empty). The reaction is carefully noted before the test is started. The apparatus is then stood in a warm place—best is an incubator at 37°C .—for twenty-four hours. If gas forms by fermentation in *a* it will give rise into *b* and the amount will be indicated by the water displaced into *c*. Normally, the fermentation test should show practically no gas, and the original reaction of the material should be unchanged after twenty-four hours. If more than one-third of the tube *c* is filled it is pathological. If then the reaction is decidedly more acid it is a carbohydrate fermentation; if alkaline and with a foul smell it is a fermentation of the albumins.

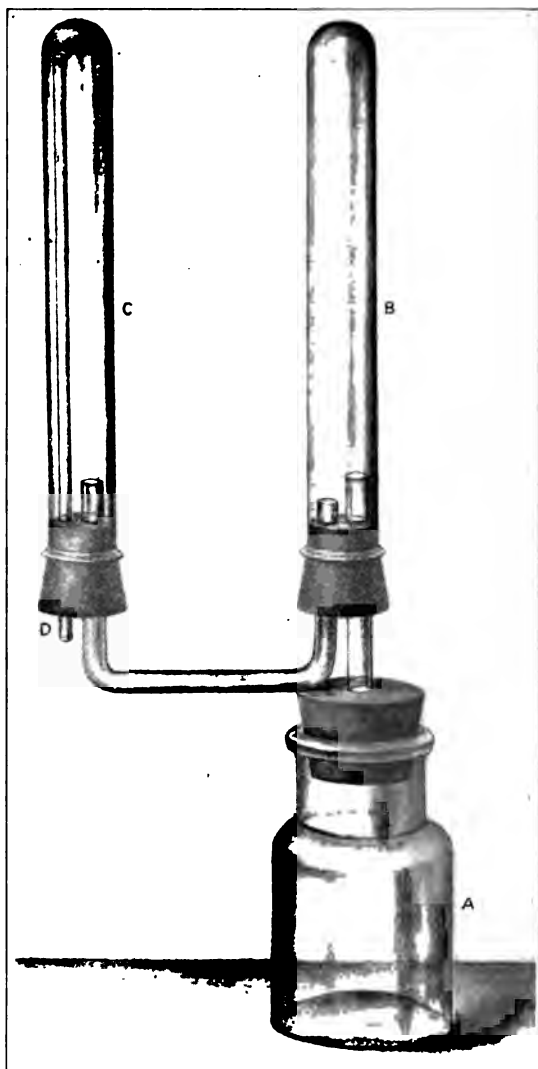
Estimation of the "lost albumins" or albumin residue. A qualitative test may be made as follows: A softened portion of the stool is filtered (often a slow and difficult process), the filtrate is shaken with silicon and refiltered, then is saturated with acetic acid to bring down the nucleoproteids, and then a drop of ferrocyanide solution is added. A decided precipitate indicates albumin. A positive test shows only that there is a decided diminution in albumin digestion. Where this occurs must be decided by other means.

Koziczowsky¹ has devised an ingenious method of determining the

¹ Deutsche med. Wochenschrift, 1904, Bd. xxx., No. 33.

albumin residuum of the feces. He employs a test diet almost identical with that of Strauss. It consists of $1\frac{1}{2}$ litres of milk, $\frac{1}{4}$ litre of bouillon,

FIG. 3



The author's modification of Strasburger's fermentation apparatus. It is constructed of perforated rubber corks, bent glass tubing, and two test-tubes each of 30 c.c. capacity. The small glass tube *D* runs up to the top of the test-tube *C* to allow for the escape of air, instead of the test-tube being perforated, as in Strasburger's apparatus.

6 gm. zweiback, 40 gm. oatmeal, 40 gm. butter, 2 eggs, 80 gm. scraped meat, and 200 gm. of mashed potato. Koziczowsky employs a known

weight of the stool in his method, but finds it cumbersome and unnecessary to dry the stool for the purpose of weighing it. To avoid this he has determined the relative weight of dry and fresh fecal matter of various consistencies, and so simplifies the procedure considerably. The following shows these relative weights: 1 gm. formed stool contained about 0.3 gm. dry substance; 1 gm. semiliquid stool (good fat absorption) contained about 0.25 to 0.27 gm. dry substance; 1 gm. semiliquid stool (poor fat absorption) contained about 0.20 to 0.24 gm. dry substance; 1 gm. liquid stool contained about 0.116 gm. dried substance.

The method consists in estimating the albumin residuum in a given weight of stool by digesting it with pepsin and HCl, then measuring the HCl consumed. Two portions, each representing 2 gm. of dried fecal matter, are taken and washed separately upon nitrogen-free filters with strong alcohol, then with absolute alcohol, and finally with dilute HCl of the strength of 3 parts in 100. One portion of the stool is then mixed with 50 c.c. of a solution containing dilute HCl, 10 c.c.; pepsin, 30 gm.; water, 100 c.c., and the other portion with the same quantity of HCl solution without the pepsin. Both flasks are corked and kept in the incubator twenty-four hours. Before sealing the flasks the amount of HCl in each portion is estimated by titrating it with 0.1 normal NaOH solution. After incubation over night the acid is measured again by titration. The flask in which there is no pepsin will show the digestive power remaining in the feces, due to the presence of proteolytic ferments. Rarely are such present, and the difference between the first reading of free HCl and the second reading in this flask seldom exceeds 2 or 3 points in terms of decinormal NaOH. The total acidity and HCl is then taken in the pepsin flask by the usual methods, with phenolphthalein and dimethylamidoazobenzol as indicators. The difference will show the amount of acid consumed in the digestion of the albumin present. In normal stools this is usually between 15 and 18 points. Koziczowsky gives no record of the tests in different diseases, owing to his lack of material. The test is much the simplest yet devised for the estimation of albumin residuum, and deserves more extended investigation.

THE CLINICAL SIGNIFICANCE OF THE TESTS. *Mucus.* As a rule the appearance of mucus in the stool indicates the presence of inflammation of the mucous membrane, and is the one trustworthy sign of that condition. There are two conditions in which mucus has no significance: (1) Thin mucus spreads over the surface of a hard, dry ball of feces without evidences of a rectal inflammation. (2) So-called mucous colic, with discharge of mucous casts.

As a general rule the form of mucus indicates the part of the intestine from which it comes, although there are many exceptions.

Bile Pigment. A green color of part or all of a stool (by the sublimate test) is pathological, except in children. It means too short a period of passage through the intestine, and that time for a normal reduction process of the bilirubin into hydrobilirubin was lacking. A normal fresh stool should give a pink color with HCl . If a color action of any kind is absent it indicates a very fat stool or an absence of bile in the intestine.

Fat. It will need a little practice to tell by the use of the diet whether there is an increase of fat in the stool. And as the normal amount of fat in the feces varies between wide limits, only a very considerable excess of fat can be detected.

The examination for fat given here is useful in watching the digestion and absorption of various amounts of fat, and in that way I have found it valuable. For instance, in one case in which there was considerable emaciation caused by a diarrhoea from insufficient proteid digestion, fats were found to be well borne, and olive oil and butter-fat were given in increasing amounts until the presence of an excess of soap and neutral fat indicated the limit of absorption and digestion. Under this diet the patient's diarrhoea stopped and he gained twenty pounds in weight.

Remnants of Meat. Normally there should be only microscopic particles of connective tissue and muscle fibre. An excess of either is often visible to the naked eye, but need not be macroscopic to be pathological.

Excess of Connective Tissue means insufficient gastric digestion, because such fibrous tissue is only digested by the juices of the stomach. The meat should be rare to give this test its full value.

Even in hyperacidity such remnants may be in excess if motility is increased.

Excess of Undigested Muscle Fibre means disturbance of intestinal digestion and probably means trouble in the upper part of the small intestine; but whether the trouble is in the trypsin of the pancreatic secretion, or in the activating action of the succus entericus, or in increased peristalsis, we can only surmise from other symptoms.

Connective tissue and muscle fibre together are sometimes found when the stomach fails to digest away the framework of fibre and the intestinal juices have no chance at the bundles of muscle fibre; thus meat lientery occurs often in acute gastric catarrh.

Pathological Carbohydrate Fermentation means poor starch digestion and indicates, as a rule, disturbance in the small intestine and usually is due to insufficiency in the succus entericus.

Pathological Albumin Fermentation means a large remainder of albumins in the feces, and indicates in Schmidt's experience serious trouble, usually some anatomical change in the mucous membrane of the small

intestine. I cannot confirm this statement from my own experience or from the experience of other observers.

Hemmeter¹ has had considerable experience with this method of examination of the stool. He has tested 8 cases of achylia gastrica and 6 cases of chronic atrophic gastritis with entire absence of HCl and ferments. In all 8 cases of achylia and in 5 cases of gastritis undigested connective fibre was found in the feces.

In 2 cases of heterochylia (variable gastric secretion—hyperchlorhydria alternating with absolute achylia in the same person) connective-tissue fibres were found only during the period of achylia. Hemmeter found that the administration of 10 c.c. of dilute hydrochloric acid (U. S. P.) with 1 gm. of pepsin diluted to represent gastric contents caused perfect gastric digestion during the periods of achylia. Thus, the amount of hydrochloric acid and pepsin can be estimated in individual cases by watching for connective tissue in the feces.

The Estimation and Clinical Significance of the Period of Passage of Food Through the Gastrointestinal Canal. The question of the length of time required for the passage of food through the gastrointestinal tract is a matter of much clinical importance and yet very little attention has been paid to the subject and no reliable data are on record. It is quite as important for the practitioner to know the period of passage as it is to ascertain how often a patient has a stool, for the two things are in no way identical. Thus, for example, a patient may have only one stool a day and yet have latent constipation which gives rise to toxic symptoms, for which the real cause is seldom recognized. Whether latent constipation is present can only be determined by estimating the period of passage or, to use the German word, the *Verweildauer*. In diarrhoea, by estimating the period of passage, it is possible to come upon an approximate idea of the seat of disturbance producing the diarrhoea. For example, if the period of passage is nearly normal the trouble lies in the lower or middle portion of the large intestine, and peristalsis is probably not increased in the small bowel. Strauss has shown that chronic colitis with several watery movements a day may be accompanied by a normal period of passage, while the period was decidedly shortened when the inflammation was in the ascending colon or small intestine. As in all other investigations into the intestinal functions, a test diet is necessary, since naturally the character of the diet has much influence upon the period of passage. Strauss found that under his test diet, containing 100 gm. of lean meat, the period was ten to twenty hours in normal cases and was increased as high as sixty hours in constipation. Maurel found that the period was thirty-six

¹ American Medicine, March 11, 1905.

to forty-eight hours under a pure milk diet. In the test diet used by Koziczekowsky the normal period was fifteen to twenty-four hours. In disease the shortest period was four hours, and in such cases the bilirubin was found unaltered and gave a green color with the sublimate test. The period of passage is very easily estimated by marking a meal with carmine and watching for the first red stool.

Occult Blood in Typhoid Fever. Two series of observations upon occult blood in the stools of typhoid fever patients have appeared during the past year. One is by Petrachi¹ and the other is included in my own series.

It would be natural to expect occult bleeding in typhoid fever, especially in the second and third weeks, when the ulcers are freshest and more liable to hemorrhage.

I tested 92 stools in 19 cases of typhoid and found occult blood once each in 3 different patients—none of whom had visible hemorrhage while under observation. Consequently, I think that these 3 cases were examples of true occult bleeding in typhoid fever.

The stools were always examined in the febrile stage, and 80 of our 92 tests were made in the interval from the second to the fourth week, when the ulcers should be freshest and more liable to bleed. We have no data as to the stools in the first week, as none of our patients were admitted until the beginning of the second.

The weeks of the disease in which the tests were made are as follows:

Second week	22 tests,	2 positive.
Third week	28 "	1 "
Fourth week	30 "	all negative.
Fifth week	8 "	" "
Sixth week	4 "	" "

The cases may be tabulated in accordance with their severity as follows:

Severe	7 cases,	1 positive.
Moderate	8 "	1 "
Mild	4 "	1 "

Petrachi has published the results of a systematic examination of the stools in 18 cases of typhoid fever. His proportion of positive cases is much greater than mine, for in 8 of his patients he found occult blood 42 times, independent of visible hemorrhage. Most of his tests were made in the second and third weeks, as in our series, and the proportion of severe, moderate, and mild cases in our two lists is strikingly alike, yet the results of the two series of observations differ radically; for while we found one positive reaction in each grade (or 3.5 per cent. of our

¹ Loc. cit.

cases), Petrachi found 42 positive tests, or 44 per cent. of his cases, the majority being of the severe and moderate types.

I cannot explain the lack of agreement in the two series of investigations, for we both used the aloin test, and our cases were very similar in severity, and the stools were examined at the same period of the disease.

Petrachi's table of severity was as follows:

Severe	.	.	.	.	.	6 cases,	4 positive.
Moderate	.	.	.	.	.	8 "	4 "
Mild	.	.	.	.	.	4 "	all negative.

I began with the hope that it might be possible to foretell the occurrence of visible hemorrhage by demonstrating occult blood in the stools some time before visible bleeding appeared. The importance of this is very apparent, since it might be possible to lessen or prevent visible hemorrhage by modifying the treatment as soon as occult bleeding indicated that a large hemorrhage was about to occur. In this I was disappointed, although my investigations have not been extensive enough to be conclusive. In 4 of my cases visible hemorrhage occurred while the patient was under observation. In 2 of them the stools were examined systematically before the hemorrhage occurred, always with a negative result. In the other 2 cases the hemorrhage occurred so soon after admission that a careful study of the stools could not be made.

It will be seen that a prehemorrhagic stage was not demonstrated and no warning of large hemorrhages was given by the presence of occult blood.

Petrachi, on the other hand, regularly found occult blood for one to five days before visible blood appeared in the stool, and he thinks that in this way he can foretell the occurrence of large hemorrhages.

Neither series of observations is large enough to be conclusive, and the subject needs further investigation.

The Movements of the Alimentary Canal. Much interesting work has been done in the physiology of the digestive tract during the past year. Not the least important is that relating to the mechanical factors in digestion, which are a very much more complicated and perfected mechanism than we had supposed before the work of Cannon and others appeared. I cannot do better than to quote freely from Cannon¹ in order to show how these advances in physiology have the most practical and immediate bearing upon the symptomatology and therapeutics of the gastrointestinal tract. Cannon's work has been carried out largely by the use of the *x*-ray in the Harvard Physiological Laboratories.

The mechanical factors in digestion perform three chief functions—the movement of the food through the alimentary canal, the mixture

¹ Medical News, May 20, 1905.

of the food with the digestive juices, and the exposure of the food to the absorbing mucous membrane. The progressive peristaltic wave is the most general activity by which these functions are effected, but the progression of the food through the canal is not uniform. Where digestive juices are lacking and absorption does not occur, as in the œsophagus, the food is moved rapidly. On the other hand, where digestion and absorption can take place, rapid progression is prevented by sphincters, and the recurring peristaltic waves passing over the food toward closed sphincters serve to mix the food with the digestive juices, as in the stomach, or expose the food to the absorbing mucosa, as in the ascending colon. In the long course of the small intestine, with no sphincters present to oppose peristalsis, peristaltic activity is infrequent, and the mixing and exposing functions are carried on by a special method—the rhythmic contraction of the circular fibres. These rapidly repeated contractions knead the intestinal contents without any considerable progression.

From the foregoing general considerations it is evident that different portions of the alimentary canal are characterized by particular adaptations of the general method of forwarding, mixing, and exposing the food.

The Œsophagus. Liquids may be shot through the gullet by the contraction of the mylohyoid muscles, as through a stiff tube, as suggested by Kronecker and Meltzer, but Cannon's investigations show that the passage of solid and semiliquid food is accomplished by the contraction of the œsophageal muscles.

The Cardia. Its function is probably to keep the passage into the stomach free from an accumulation of food and, when necessary, to prevent regurgitation. Cannon has made an interesting and remarkable observation upon the cat and has seen rhythmic relaxations of the cardia, so that fluid food streams from the stomach into the œsophagus, even above the level of the heart, then is pressed into the stomach again by a peristaltic wave, only to be released a moment later to pour into the œsophagus anew. He has watched this activity, recurring at intervals of one or two minutes, for more than a half-hour. It usually begins soon after fluid food is given; within a varying period the intervals between discharges gradually lengthen, until the action entirely ceases and the cardia seems tightly closed. During this ebb and flow of food in the œsophagus the animal evinced no signs of distress, and, if allowed her freedom, did not vomit. On re-examination the movements were again seen. The regular appearance of these phenomena in different animals makes Cannon think that they must be normal. It may be that relaxations of the cardia of this character are associated with eructations of gas and stomach contents in cases of gastric fermentation.

This rhythmical ebb and flow of food back into the lower œsophagus may be intended to flush the accumulated food down into the stomach and prevent accumulation.

The Stomach. The stomach is a place of storage for the food, and also a place in which carbohydrate and proteid digestion may occur. These functions of the stomach are performed in different parts of the organ.

Undoubtedly the most important feature of the newer physiology of the mechanics of the stomach is the knowledge that it consists of two parts physiologically distinct. The larger, left part of the stomach is the cardiac portion; the right is the pyloric portion. The pyloric portion is characterized during digestion by the continuous passage of peristaltic waves over its surface to the pylorus. The cardiac portion is without peristalsis, but as the food is pressed from the pyloric portion into the intestine the muscles of the fundus by tonic contraction squeeze the contents into the more active division, as into a hopper.

The efficiency of peristalsis in mixing the food with the gastric secretions depends upon the contraction of the pyloric sphincter. So long as the sphincter holds, each constriction ring coursing from the middle to the end of the stomach presses the food into a blind pouch; the food, unable to escape through the pyloric opening, has as its only outlet the opening in the advancing ring. This is an admirable device for bringing the food under the influence of the glandular secretions of the pyloric region, for, as a constriction occurs, the secreting surface enclosed by the narrowed muscular ring is pressed close around the food within the ring. As the constriction advances it continually presses inward fresh glandular tissue, and, furthermore, as the constriction advances, a thin stream of food is continuously forced back through the ring and thus past the mouths of the glands—a food stream sweeping in one direction past an ever-refreshed mucous surface moving in the opposite direction. Thus is the food repeatedly exposed to the secreting surface of the pyloric end and thoroughly mixed with the gastric juice.

The larger cardiac end of the stomach is the reservoir for the food. As peristaltic waves are absent, the food remains unmixed with the gastric juice and the inner parts may retain their original reaction for even two hours.

Thus, salivary digestion may go on unchecked by free acid for a long time in the cardiac end.¹

The Pylorus. Differing views have been set forth as to the manner in which the pylorus opens and permits the exit of the food. Some investigators have declared that the sphincter relaxes only at the end

¹ PROGRESSIVE MEDICINE, December, 1904, p. 64.

of several hours to allow the stomach to empty. Observations under more natural conditions, with the stomach tube and with the x -rays, show that the stomach is not emptied at once at the end of gastric digestion, but progressively during the period. There is thus an intermittent closure of the pylorus. The channel is usually closed, yet occasionally it opens; and when it opens, the peristaltic waves, usually engaged in churning the food, now serve to propel it into the intestine.

The factors affecting the pylorus are as yet but little understood. It seems probable that the signal for relaxation is the presence of free hydrochloric acid on the stomach side of the pylorus.

In the Harvard Physiological Laboratories last year it was proved that when carbohydrates, proteids, and fats of the same consistency are separately fed in equal amounts, they do not leave the stomach at the same rate. Fats remain long in the stomach; the discharge begins slowly and continues about as rapidly as the fats are absorbed or passed into the large intestine. Carbohydrates begin to leave the stomach soon after their ingestion (within ten minutes); they pass out rapidly and at the end of two hours reach a maximum amount in the small intestine—almost twice the maximum for proteids and two and one-half times the maximum of fats—both of which maxima are reached only at the end of four hours. Proteids frequently do not leave the stomach at all during the first half-hour and occasionally not for an hour. After two hours they accumulate in the small intestine to a degree only slightly greater than that reached by carbohydrates an hour and a half earlier. The departure of proteids from the stomach is much later than that of carbohydrates and slower than either carbohydrates or fats. Consequently there appears to be a remarkable mechanism in the pylorus which permits carbohydrates, not digested by the gastric juice, to pass quickly into the intestine, and retains the proteids, digested in the stomach.

If the presence of free acid on the stomach side of the pylorus stimulates the relaxation of the sphincter, this mechanism is largely explained. The theory of the action of the pylorus which Cannon suggests is as follows: Free acid in the stomach opens the pylorus and initiates the chemical control of the sphincter. The opening of the pylorus permits the exit of a portion of the acid chyme. We have seen that acid in the duodenum keeps the pylorus closed; but acid in the duodenum also stimulates the flow of the alkaline pancreatic secretion. No inorganic acid is normally present beyond the first few inches of the small intestine. The acid, therefore, is here neutralized. As the neutralizing proceeds, the stimulus closing the pylorus is weakened, until the acid in the stomach again opens the sphincter. Again, the acid food passes out and the acid closes the sphincter to further passage until the duodenal changes finish their slower course.

Thus, automatically, carbohydrates would go early and quickly into the intestine to meet their proper ferment; and proteids, postponing the presence of free hydrochloric acid by uniting with it, would be retained in the stomach to suffer alternation by the gastric juice and only after such alternation be permitted to go on. Thus, the intestine would be saved from overwhelming discharges from the gastric reservoir; and by this same automatic mechanism the gastric secretion, harmful to the action of intestinal ferments, is rendered innocuous because of its admission, little by little, into the duodenum.

The Small Intestine. The small intestine is not only a region of digestion, but also a region of absorption. Throughout its length there are no sphincters. Peristalsis cannot act, therefore, to mix the food with the secretions or expose the digested food to the absorbing wall. The admirable process by which these functions are performed Cannon has termed "rhythmic segmentation." In the small intestine there are, then, two mechanical activities—rhythmic segmentation of the food, the most common activity, and peristalsis.

This process of rhythmic segmentation consists of contractions of circular fibres of the small intestine which occur in pairs, first in one place and then in another, pressing the food into sections and then breaking these up again, churning, as it were, the intestinal contents, but not moving them on. After this has lasted for a time a wave of peristalsis pushes the food down toward the large intestine.

By these segmenting movements the food is thoroughly mixed with the secretions of the liver and pancreas. These contractions must have a considerable effect in squeezing out secretion from the intestinal glands and stimulating their blood supply.

The Large Intestine. When the large intestine is full the material in the distal portion is usually composed of rather hard lumps, while that in the proximal portion is soft and of uniform consistency. The condition of the contents in these two regions indicates a division of the large intestine into two parts, and the mechanical activities of these two parts correspond to the differentiation. In the distal portion the material is slowly advanced by rings of tonic constriction. In the proximal portion the common movements are waves of constriction running backward toward the cæcum.

These waves of antiperistalsis work up against the structure which has always been spoken of as the ileocæcal valve. It seems probable, however, that the point where the small intestine enters the large one is equipped with a much more perfect valve mechanism than was formerly supposed. Indeed, the waves of antiperistalsis correspond so closely to the waves of contraction that work down upon the pylorus and appear to perform much the same function—namely, to mix the food more

intimately with the intestinal juices—that it seems probable that the ileocæcal opening is equipped with a true sphincter. These antiperistaltic waves are of great value to the clinician, as it is by their action that nutritive enemas are retained and carried up to a point where absorption can take place. Cannon has proven by the use of the x -ray that small, mushy enemas are easily carried back along the large intestine by the antiperistaltic waves.

He has never seen small or mushy enemas carried back through the ileocæcal valve; but when large injections are given of the consistency of cream the waves of antiperistalsis may carry them into the small intestine.

With each new accession of food in the large intestine a strong tonic constriction of the cæcum and proximal colon occurs, which presses onward into the distal colon some of the contents of these parts. Antiperistaltic waves follow at once the tonic contraction, so that much of the food which has been pressed onward is returned toward the cæcum. With the repetition of this process, however, more and more material accumulates in the distal colon until finally a persistent ring of contraction separates this material from the region of antiperistalsis; as still more food appears in the large intestine this ring moves slowly onward toward the rectum, pressing the mass before it, and is followed by other similar rings carrying onward similar masses by very slow peristalsis. The masses of waste material thus advanced accumulate in the lower part of the distal colon and are ultimately passed from the body in the act of defecation.

In the cat defecation is preceded by the disappearance of the slowly moving peristaltic rings in the lower part of the distal colon and the appearance of a strong, broad constriction near the beginning of this region. The band of constriction is then drawn downward by a shortening of the longitudinal muscles. Thereupon, the constriction which divides the lumen moves slowly along and, with the aid of the voluntary abdominal muscles, pushes the separated mass through the relaxed sphincters out of the canal.

Inhibition of the Movements of the Alimentary Canal during Emotions. Observations on the cat, made in the Harvard Physiological Laboratories in 1898, showed that gastric peristalsis is stopped whenever the animal manifests signs of rage, distress, or even anxiety. With the similarity between the extrinsic innervation of the stomach and that of the intestinal tract, it was of interest to note that emotional states have the same effect on movements of the intestines that they have on movements of the stomach. Any signs of emotional disturbance, even restlessness and continued mewing, which indicate, perhaps, uneasiness and discomfort, were accompanied by total cessation of segmenting movements in the

small intestine and antiperistalsis in the proximal colon, as well as complete quiescence of the gastric mechanism. Evidently chemical factors of digestion can have little importance, if fears and worry prevent the delivery of the food to regions of active digestion and absorption.

Pericolitis Sinistra. Sigmoiditis. The possibility of the existence of acute inflammation of the walls of the descending colon and sigmoid flexure with involvement of their peritoneal covering has been recognized for some few years past. The condition gives symptoms similar to appendicitis except that they occur upon the left side, although pathologically it is more nearly analogous to perityphlitis.

Reference was made to the subject by Hemmeter in **PROGRESSIVE MEDICINE**, December, 1903, p. 44, in which he mentioned the work of Mayor and Bittorf as well as his own.

Since then the subject has excited considerable interest and numerous cases of localized inflammation of the left colon and its peritoneum, sometimes with abscess, have been reported.

Two communications by Rolleston¹ and Rosenheim² have been published during the past year, that of Rolleston's being particularly valuable. Like inflammation in the right iliac fossa, left-sided colitis may give rise to a number of conditions. Thus there may be: 1. Local peritonitis of comparatively slight intensity about the descending colon or sigmoid flexure. 2. A local abscess connected with the focus of original inflammation. 3. The rupture of such an abscess may cause a general peritonitis.

The clinical manifestations are as follows: There is a period of constipation which is followed by pain in the left pelvis, accompanied by fever, and perhaps by vomiting. On palpation there is some tenderness and usually a sausage-shaped tumor in the left iliac fossa. Leukocytosis has been noted in some cases.

The treatment of this milder form of the condition is to promptly relieve the constipation by enemas and purgatives. Cold locally may help the pain.

The inflammation may be and probably is usually caused by fecal accumulation. Occasionally it appears to commence in a diverticulum of the large bowel, as in cases reported by Rolleston. The inflammation may be localized in one or more epiploic appendages, as in cases reported by Rixford³ and Bland-Sutton.⁴

When the inflammatory process goes on to suppuration the abscess spreads itself up and down along the bowel. It may break into the colon,

¹ Lancet, 1905, p. 854.

² Zeitschrift f. klinische Medizin, Bd. liv., Nos. 5 and 6.

³ California State Journal of Medicine, October, 1904, p. 296.

⁴ **PROGRESSIVE MEDICINE**, December, 1904, p. 128.

and has been known to burst into the urinary bladder. The physical signs of such an abscess are apt to be indefinite and, unless the case has been followed from the onset, are usually mistaken for malignant disease.

If the presence of a collection of pus is reasonably certain it should be opened.

Rolleston reports a case of general peritonitis due to the rupture of such an abscess. Stercoral ulcers may rupture directly into the general peritoneal cavity without the formation of pus, as in a case of my own where the rupture occurred in false diverticula of the sigmoid flexure.

Ptosis of the Abdominal Aorta. Stifler¹ says the dragging upon the connective tissue of the retroperitoneal space produced by the displacement of the various abdominal viscera may finally bring about ptosis of the abdominal aorta itself. When this occurs it is probable that the aortic displacement is responsible for some part of the complicated symptom-complex which is seen in general enteroptosis. The aorta may be affected in two ways: First, it may be associated with dilatation in the portion of the vessel lying below the transverse mesocolon. It may be enlarged to twice its usual size and can be plainly palpated two fingers' breadth above the navel, sometimes even higher. The aorta is quite firmly connected with the pancreas directly and with the duodenum indirectly through the hepatoduodenal ligament, and in general abdominal ptosis the long-continued dragging upon the aorta by these fibrous bands causes dilatation and displacement. Second, the contraction variety where the vessel is narrow and thickened and elongated. It can be palpated through the abdominal wall through its whole length as a hard, tortuous cord, pulsating and tender. The thickening is without doubt inflammatory and it is due to irritation spreading from the peritoneum in various inflammatory conditions, as gastric ulcer, appendicitis, and paranephritis and perinephritis. In both forms there is usually a systolic thrill and bruit. It would be expected that such interference with the aorta would give rise to decided reflex disturbance, and there is little doubt that it does. However, its part in the symptomatology of enteroptosis will not be determined until we have a more definite understanding of the reflex disturbances produced by this complicated condition. The cases of marked ptosis and enlargement of the aorta reported by Stifler seem to be of the type of general enteroptosis that have considerable pain about the centre of the abdomen. Stifler calls this pain "sympatheticismus," and it may be that it is produced by interference with the sympathetic supply of the aorta and its branches. One very distinctive symptom of ptosis of the aorta is the extreme pulsation of the vessel so that the patient complains of an abdominal

¹ Berliner klin. Wochenschrift, 1904, Bd. xli., No. 36.

heart or two hearts. From what has been said it will be seen that displacement of the aorta always occurs in connection with the displacement of one or more of the abdominal viscera, and consequently the predisposing causes of aortic ptosis are the same as those of enteroptosis in general. However, the development of aortic displacement is especially favored by the improper treatment of floating kidney by badly fitting bandages or belts. Properly fitting abdominal support to relieve the traction and irritation of the aorta is the best method of treatment. Fixation of a movable kidney has had good results in several cases. The best methods of treatment are those directed to the relief of enteroptosis as far as possible, such as diet, hydrotherapy, and rest.

Treatment of Tape-worm. Boas¹ says that in his large experience fluid extract of *filix mas* has proven by far the most reliable and least toxic of all tape-worm remedies. He has never had a failure nor a case of poisoning. He thinks, however, that the cause of his success lies not so much in the remedy as in the technique of its administration. He lays very little importance upon the preliminary fasting and purging that are usually thought to be necessary. Indeed, the period of abstention from food may increase the danger of intoxication with the drug. The method of the administration of the vermifuge is very much more important than preliminary treatment.

Boas has found that he obtains equally as good results with small doses as with larger ones, and rarely gives more than 5 to 8 gm. of the extract for adults. The best form of administration is in a thin emulsion with gum arabic. This rarely causes vomiting, and even when it does it is so much the best way to give it that a hypodermic of morphine is warranted to ensure retention in obstinate cases. If the drug is given in capsule, both capsule and extract must be absolutely fresh.

Boas administers the dose in the morning, and then gives no food or drink at least for six hours, so that the drug is not diluted and exerts its full effect upon the worm. At the end of the period a purge must be given, preferably some saline or some bitter water. Oil must be avoided, as it increases the solubility of the drug and increases the tendency to poisoning. The important part of the treatment is the prolonged period of fasting after the *filix mas* is administered and before the purge is given. If this is insisted upon, then smaller doses of the drug are quite as efficient as larger ones and toxicity is avoided.

Boas reports a typical case as an illustration of his method. A German lieutenant had acquired a tape-worm in South Africa and had undergone three unsuccessful attempts at removal with large doses of extract of *filix mas*, which had produced decided toxic symptoms. The patient

¹ Therapeutische Monatshefte, December, 1904, Bd. xviii.

presented himself at Boas' private clinic at eight o'clock in the morning, without preliminary treatment. He was given 8 gm. extract of filix mas in emulsion. Seven hours later he took two glasses of Apenta water and no food or drink in the interval. At six o'clock in the evening he passed a thin stool with the worm intact. He was then encouraged to eat freely and suffered no unpleasant results.

The Entrance of the Larvæ of Ankylostoma through the Skin. Fritz Schaudinn¹ has confirmed the experiments of Looss, which have shown without much doubt that the larvæ of ankylostoma may enter the intestine through the skin. Schaudinn's experiments were carried out with monkeys. A watery solution of the stool containing ankylostoma was spread upon the back, after shaving, and allowed to dry there. Infection was entirely successful, and when the animals died large numbers of ankylostoma were found in their intestines. Professor Looss showed his preparations during the Zoological Congress in Bern, August, 1904, illustrating the method of passage of the ankylostoma larvæ from the skin to the intestine in dogs. The larvæ enter into the veins of the skin, then go through the right heart into the capillaries of the lung, then into the alveoli and wander through the bronchi, trachea, larynx, œsophagus, and into the intestine. A portion of the larvæ go into the lymph system and then finally into the veins, although some lodge in the lymph glands. Professor Looss has demonstrated every stage of these complicated procedures while in preparation. Schaudinn himself found five larvæ in the heart blood and several in the lungs of the monkeys he inoculated. He says that in his opinion the entrance of ankylostoma through the skin is no longer susceptible of doubt.

"Anæmia in Porto Rico." Uncinariasis. The appearance of the admirable monograph by Ashford, King, and Igaravidez, which constitutes the report of the Porto Rico Anæmia Commission, marks an era in the study of hook-worm disease in America.² Their preliminary notes were quite fully reviewed in *PROGRESSIVE MEDICINE*, December, 1904, and in this volume is the full report.

From the establishment of their field hospitals, April 30 to August 15, 1904, no less than 5490 cases were treated for uncinariasis. Of these 1029 could not be followed long enough to definitely determine the result. Of the remaining 4500 cases 59 per cent. were cured, 2 per cent. were not improved, and less than 0.5 per cent. died, while the remaining 40 per cent. were improved.

Besides saving thousands of lives the material observed has been carefully studied and analyzed. Altogether the report is a credit to

¹ Deutsche med. Wochenschrift, 1904, Bd. xxx., No. 37.

² Ashford, King, and Igaravidez, *Anæmia in Porto Rico*, Porto Rico, 1904.

American medicine, and takes rank with the work of the Yellow Fever Commission in Cuba.

The main results of the investigation of the Commission are that the anæmia which affects 90 per cent. of the rural population of Porto Rico is due to the hook-worm, and that in the great majority of the cases the disease is curable.

TREATMENT OF UNCINARIASIS. The Anæmia Commission say, as a result of their large experience, that there are only three drugs worthy of serious mention—thymol, male fern, and beta-naphthol.

Thymol is preferred to male fern in America and England. The Commission used it in the majority of their successful cases. Toward the end of their work beta-naphthol was found so successful that it bade fair to take the place of all other remedies.

The method of administration of the thymol was as follows: In the evening a dose of either magnesium or sodium sulphate was given; usually an ounce was sufficient, and, as a rule, this amount ought not to be exceeded, as too much salts may produce an exhaustive diarrhoea. The object to be obtained is the emptying of the bowels so that the anthelmintic will act upon an exposed mucous membrane. On the next day the patient is kept in bed without food and is given 30 grains of finely powdered thymol in capsules at 8 A.M., and at 10 A.M. the dose is repeated. At 12 M. another purge of salts is taken.

All solvents of the thymol must be avoided while the drug is in the intestinal tract, such as alcohol, ether, glycerin, turpentine, chloroform, and oils. The Commission say that, in their opinion, the danger of the drug has been greatly exaggerated, and they think it is exceedingly inoffensive if solvents are avoided and the drug is properly given.

It is contraindicated in great debility, very old age, pregnancy, advanced cardiac or other organic disease, anasarca, a tendency to vomiting and diarrhoea, and in dysentery, although the imminence of the danger from the hook-worm may even demand its use in these conditions. Under such circumstances the dose should be modified and reduced one-half or more.

Nothing in their experience indicated that the *Uncinaria americana* was any easier to expel than the old world parasite.

Except in debilitated cases the thymol was repeated once a week until the ova were absent for a period of several weeks, as investigation showed that the disease had periods of latency and that recurrences were common, either from revival of the parasites or reinfection.

Male fern is the favorite drug on the continent of Europe because it is thought to be less dangerous and more effective than thymol.

The Commission do not believe that it is less dangerous, and it is certainly as disagreeable to take, if not more so. However, they gave it in

some cases where the parasites were resistant to thymol. It gave very good results in a part of the cases; in others it did not. It seemed to cause more dizziness and nausea, and patients generally complained that they felt sicker and weaker after its use.

Undoubtedly both drugs are useful, and a choice between them will depend upon circumstances and the preference of the physician. A change from one to the other is often very effective in obstinate cases.

Beta-naphthol. The credit of the discovery that this drug was a very useful anthelmintic in hook-worm disease belongs to Bentley.¹ He abandoned thymol two years before writing his article in favor of beta-naphthol.

The drug appears to be quite as valuable as thymol as an anthelmintic, is not as toxic, and costs one-tenth as much.

The Porto Rico Commission have employed it in a limited number of cases and confirm Bentley's statements as to its effectiveness.

A Specific Toxin Elaborated by the *Dibothriocephalus Latus*. The occurrence of cases of very severe anæmia due to the presence of the *dibothriocephalus latus* in the intestine of man suggests that there must be some toxic substance elaborated by the worm that has a hæmolytic action. The same may be said of the *ankylostoma duodenale*. This seems the only explanation for the severe anæmia which approaches the type termed pernicious, because such marked blood changes could not be caused by the loss of blood or the digestive disturbance occasioned by the parasites.

The supposition that a hæmolytic toxin was elaborated by the parasite was first confirmed by Tallquist and Schaumann, who produced a distinct anæmia in dogs by feeding them with the fresh tape-worms.

That this poison is specific is suggested by the work of Isaac and von den Velden,² who found that when an extract of the fresh proglottides of the *dibothriocephalus latus* was added to blood serum from a person harboring the worm an albuminous precipitate was obtained.

As confirmatory evidence that the precipitate was produced by some substance obtained from the *dibothriocephalus*, a rabbit was immunized with the worm extract. It was found that the rabbit's serum contained a substance which produced a precipitate with the worm extract in the dilution of 1:1000.

These investigations throw much light upon the pathology of parasitism, for it can hardly be questioned that the *dibothriocephalus* at any rate produces an albuminous toxic substance that is specific and hæmolytic in its action.

¹ Indian Medical Gazette, Calcutta, April, 1904.

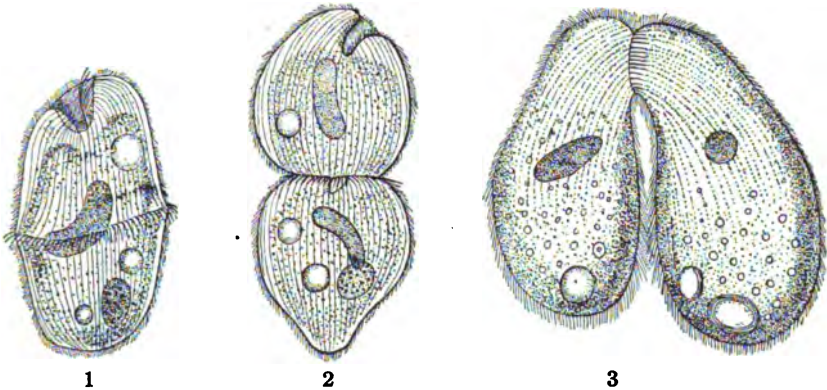
² Deutsche med. Wochenschrift, 1904, Bd. xxx., No. 27.

Perhaps the only weak point in the chain of evidence is that it is not proven by these experiments that the toxin is produced during the life of the worm and is not a necrobiotic change. However, the theory of a specific toxin clears up many of the points in the symptomatology of different parasites that have up to this time been obscure.

Balantidium Coli. Another form of intestinal parasite in man is the balantidium coli, of which a case has been recently reported by Koslowsky.¹ This parasite, it will be remembered, is a protozoon that seems almost certainly to bear some etiological relation to certain forms of diarrhoea. It is a common inhabitant of the intestine of the hog, where it is harmless. It is supposed that the protozoa are transferred to man in sausages.

The parasite is of oval shape, 60 to 100 microns long and 50 to 70 broad, and is covered with ciliæ that are in rapid motion when the organism is

FIG. 4



Balantidium coli. 1 and 2. Stages of division. 3. Conjugation. (After LEUCKART.)

alive. Ectosarc and endosarc are sharply differentiated. The endosarc is granular and contains a kidney-shaped nucleus, generally two contractile vacuoles and granular detritus. Motion is so rapid that it cannot be followed under the microscope. The protozoon dies very quickly and undergoes fragmentation. (Fig. 4.)

Koslowsky thinks that the parasite occurs oftener in man than appears in the literature. Its presence is hard to detect, since it is very easily overlooked in the feces and indeed is not at all constantly present in the discharge from the bowel.

In Koslowsky's case the infection by balantidium was a complication and not the cause of death. The patient had had a diarrhoea for several years and the parasites had been found in the feces. Death ensued from general tuberculosis. Autopsy showed the usual lesion of balantidium

¹ Archiv f. Verdauungskrankheiten, 1905, Bd. xi., part i.

infection, namely, ulcers in the rectum and large bowel, with undermined edges.

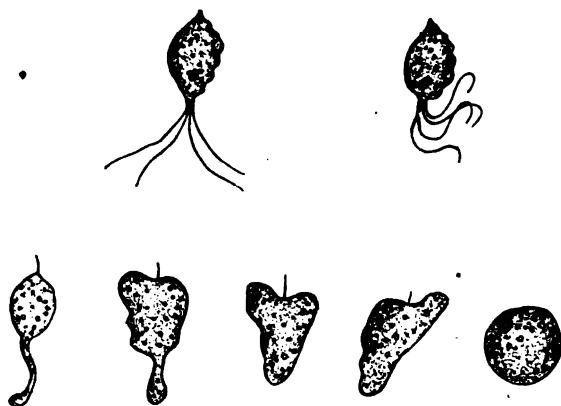
There is usually widespread catarrhal inflammation beside the ulceration.

Numerous balantidiums were found in the mucosa and submucosa, but not in the lumen of the veins.

The symptoms of the condition are obstinate diarrhoea, sometimes with pain and mucus, pus and blood in the stools. Anæmia, emaciation, and a general cachexia may ensue in severe cases.

The treatment is directed toward the removal of the parasites and the checking of the diarrhoea. Enematas of acetic acid, carbolic acid, iodine, and opium have been employed.

FIG. 5



Cercomonas coli hominis. (After MAY, from MOSLER.)

Flores cinæ, filix mas, calomel, and keratinized quinine pills are some of the vermifuges given by the mouth. Tanalbin and bismuth in large doses may be used for the diarrhoea.

Rectal Feeding. Edsall and Miller¹ conclude that it seems possible that some method of preparation of nutritive enematas may be devised which will permit of the absorption of a varying amount of food having a value in calories of 500 to 700. According to recent investigations this would be enough in some cases to prevent loss of weight for a considerable time, but whether this means normal nutrition is still doubtful. At any rate, as Edsall² has previously shown, nutritive enematas are rarely absorbed sufficiently to give even this food value. The most valuable functions served by rectal feeding at present are, first, and most important, to provide fluid and various inorganic salts for the tissues; second, to

¹ American Medicine, 1905, February 4th.

² University Medical Magazine, March, 1900.

furnish a certain fraction of the requisite amount of food needed by the organism, perhaps a third to a sixth; third, for the psychical effect upon the patient and his friends. Edsall and Miller think it doubtful whether the amount of actual food provided will ever be increased by improved methods of preparation or administration to the point where it will be possible to prevent actual tissue loss. The occasional cases in which nutrition seems well sustained or improved entirely by rectal feeding cannot properly be used as examples of what can be expected from nutritive enemata. The results obtained in these cases are best explained by the occurrence of reverse peristalsis in the large intestine, which carries the food up into the absorptive portion of the colon and sometimes well past the ileocaecal valve. The form of food apparently most imperfectly absorbed is fat. This is unfortunate, because fat provides twice as much energy for the organism as the same amount of either proteids or carbohydrates. With the purpose of providing fat in an easily assimilable form Edsall and Miller have carried out a series of investigations to determine: first, whether fats in the form of soap could be easily prepared and administered, and what their nutritive value is when given by the bowel; second, whether a good emulsion of fat could be obtained that would stay emulsified after its introduction into the bowel, and what was its food value. The experiments with soap were carried out with special soap prepared in their laboratory, and as little irritating as it was possible to make it. Even then it proved too irritating to be used as a rectal food, and besides it was irregularly and not very perfectly absorbed. They succeeded in obtaining a good fat emulsion by taking the white of nine eggs and an equal amount of 0.5 per cent. sodium carbonate solution, heating them together upon the water-bath, adding cod-liver oil and shaking thoroughly for five minutes. The preparation so made remained in excellent emulsion after its introduction into the bowel. The amount of fat absorbed was considerable, and it was higher than that absorbed from the mixture of milk and egg; indeed, it was more than was formerly believed possible by some observers. Their results in these experiments offer some encouragement for further attempts to improve the methods of rectal alimentation.

In discussing the relative value of carbohydrates and albumin in nutritive enema, Reach¹ says that carbohydrates are superior and dextrine especially valuable. Alcohol has also a place in this form of feeding.

Enterokinase. An "Activating" Enzyme. One of the most interesting recent advances in the physiological chemistry of the intestine is the

¹ Centralblatt f. der Grenzgebiete, 1904, Bd. vii., Nos. 8, 9.

discovery of a substance secreted by the intestinal glands which has the power of activating or increasing the power of trypsin. This substance is a peculiar enzyme, which has been called enterokinase.

It has the power of greatly increasing the power of trypsin, indeed, it is probable that trypsin is not active unless enterokinase is present.

Glaesner¹ has confirmed in man the original observation concerning this activating enzyme which was made on dogs. He obtained pancreatic juice directly from a fistula and showed that it contained no preformed trypsin, but could be activated by intestinal extracts. Hamburger and Hekma² found enterokinase in human succus entericus. The amolytic and lipolytic enzymes of the intestinal juice apparently need no activating.

The subject is full of interesting possibilities, quite as important from the clinical as from the purely scientific standpoint. Thus, digestion of muscle fibre which we have thought to be dependent upon trypsin may be imperfect, not because the function of the pancreas is disturbed, but because the intestinal secretion is deficient. This adds to the difficulty that has always been encountered in devising a method of measuring the activity of pancreatic digestion.

Action of Various Drugs upon Intestinal Movement. Ott and Ulman suspended a piece of the small intestine of a cat in a glass full of a salt solution, through which oxygen was kept streaming at body temperature. The lower end of the piece of bowel was attached to the lever of a registering apparatus, and the substances to be experimented upon were then dropped into the fluid.

Their experiments have a very interesting bearing upon the therapeutic and physiological effect of the substances used.

Adrenalin contracted the arterioles, but relaxed the longitudinal fibres and stopped the pendulum movement.

Extract of spleen increased and pancreas decreased the intestinal movement. Extract of other organs had no marked effect.

In confirmation of MacCallum's investigations referred to in *PROGRESSIVE MEDICINE*, December, 1904, Ott and Ulman found that small amounts of sodium citrate increased the force of peristaltic movements, while when calcium chloride was added the muscle relaxed and the contractions became weaker, slower, and irregular.

This is an observation of considerable therapeutic value. I have used calcium chloride in amounts of 10 grains to 1 pint of normal salt solution when giving the latter by the bowel, and am certain that it has considerable power in aiding in its retention.

¹ Zeitschrift f. physiologische Chemie, 1904, Bd. xl. p. 465.

² Journal de physiologie, 1902, iv. 5.

Ott and Ulman found that atropine relaxed spasm and increased the force of the contraction.

Eserine produced a rapid tetanic contraction. Pilocarpine had somewhat the same action. Strychnine increased contraction, while nicotine produced a sudden tetanic contraction followed by a slow relaxation.

A very interesting part of the investigations showed that products of proteid digestion are active stimulants to peristalsis. Thus, a good digestion would predispose to regularity in the evacuation of the bowels, and is one reason why constipation occurs in dyspeptics.

THE LIVER.

The Stools in Disturbance of the Liver Function. Obstruction to the entrance of bile into the intestine is accompanied by light or whitish stools, and the absence of bile can be demonstrated by the failure of color reaction with the sublimate test.¹ There is, however, an exception to this rule in the so-called "acholic stool without icterus" when the stool is white, but where there are no other evidences of biliary obstruction. Nothnagel, who first described this condition, ascribed it to a functional hyosecretion of the liver, but later agreed with von Jaksch and von Fleischer that such absence of color of the feces is caused either by insufficient fat absorption or a reduction of the hydrobilirubin into a colorless substance (leukohydrobilirubin). In the latter case the surface of the stool turns brown on standing in the air, while in fatty stools the brown color appears after extracting with ether.

The sublimate test is a reliable means of detecting these pseudo-acholic stools, giving the reaction for hydrobilirubin unless the stool is not fresh when examined or has undergone a great deal of fermentation in the bowel.

The most important symptom of biliary obstruction is insufficient fat absorption, which may reach such a degree that 25 per cent. to 50 per cent. of the ingested fat is found in the stool. The reason for this well-recognized fact is still not determined. It is hard to see why the pancreas has not the power of caring for this extra fat, especially as it is known now that some fat splitting takes place in the stomach. Probably the bile furnishes some stimulation to the intestinal epithelium, aiding absorption.

Absence of Putrefaction in the Feces in Jaundice. Schmidt says that the old statement which is sometimes found in recent text-books, that intestinal putrefaction is increased when bile is absent is entirely wrong.

¹ Adolph Schmidt, loc. cit.

Bile undoubtedly has some antiseptic properties and the ethereal sulphates are increased in the urine in jaundice, but the more reliable methods of measuring the amount of intestinal putrefaction and of estimating the intestinal bacteria (Strasburger) show that putrefactive changes in the stool are really less than normal when bile is absent. The reaction of such stools is always acid, but that is due to the fatty acids present and not to fermentation.

The reason for this lack of putrefaction is found in the large proportion of fat in the stools of jaundice. Fat does not putrefy, as does the albumin in feces from cases of pancreatic insufficiency, and consequently foul stools are a symptom of not liver disease but of insufficient albumin digestion such as is present in pancreatic disease. Consequently, jaundice does not lead to enteritis, as does disease of the pancreas, and bile may be absent for long periods of time without intestinal irritation. Schmidt contradicts another old-received idea that jaundice is apt to be accompanied by constipation. He says that the stools are large and free and come with the normal "period of passage" on account of their large percentage of fat. These observations have been confirmed by Boas, who explains the absence of constipation by the gently stimulating action of the excessive amount of fatty acids. Schmidt remarks that this throws an interesting light upon the treatment of chronic constipation by increasing the fat of the diet.

Febrile Syphilis of the Gall-bladder Ducts and Liver. Riedel calls attention to the existence of a form of syphilis of the liver, gall-bladder, and bile-ducts that runs a febrile course, is accompanied by pain, and closely resembling gallstone colic. The differential diagnosis is extremely difficult in all cases and is complicated by the fact that this form of syphilis of the gall-bladder and liver may or may not be accompanied by jaundice and may occur with high fever but without pain, just as gallstones may be without jaundice and pain.

In syphilis of the liver and gall-bladder with pain there are usually adhesions between the bladder and surrounding organs, and the pain may often be due to that cause, although Riedel cites one case in which there was exquisite suffering, and operation showed diffuse lues of the liver alone without involvement of the gall-bladder. Riedel's attention was first called to the condition ten years ago when he had an opportunity of observing a case that presented the typical clinical picture of cholecystitis from a gallstone impacted in the neck of the gall-bladder. Operation showed nothing in the gall-bladder but a little thick bile, but there were thick adhesions connecting the tip of the gall-bladder with the neighboring organs, and fresh deposits of fibrin upon the surface of the liver and gall-bladder indicating an acute inflammation. The liver contained a number of grayish nodules that were undoubtedly syphilitic.

The patient recovered entirely under the administration of potassium iodide. In two other cases Riedel recognized the luetic character of the symptoms, but the pain was so intense that he operated and found diffuse adhesions between the gall-bladder and the duodenum.

In still another case with pain in which he diagnosed syphilitic hepatitis and cholecystitis he refused operation, but the patient (a physician) insisted and the laparotomy revealed syphilis of the liver, but without cholecystitis and without adhesions.

Three of his cases had persistent fever lasting over a long period of time resembling a hectic temperature, but, as the subsequent course of the case showed, without pus. The fever was apparently due to the tertiary syphilitic infection and was of the type first described in this country by Musser, and which I myself have come to regard as a definite symptom of tertiary syphilis. It has been present to some extent in every one of the cases of hepatic syphilis that have come under my observation.

Riedel has seen and recognized many cases of liver syphilis since his first experience. He naturally did not operate upon them and of course could not give the exact condition of the liver, but all were benefited by potassium iodide.

The interesting and important point in his series was the great similarity that the condition bore to gallstone cholecystitis and sometimes to malignant growth.

In his subsequent experience only one case had fever. The condition occurs generally in the well-to-do, and the patients have wandered from doctor to doctor until the true character of their affection was recognized, and they recovered under antisyphilitic treatment. One of his patients had been under treatment for an inoperable gastric carcinoma, but was entirely relieved by six bottles of potassium iodide.

Whether a diagnosis is made of syphilis of the gall-bladder or of the liver, antispecific treatment is indicated in both cases and operation is to be considered only when the pain is not relieved by mercury or iodides and the presence of adhesions is suspected. Even then the possibility of great pain being produced by syphilis of the liver alone must be remembered.

ACUTE PRIMARY CHOLECYSTITIS. A much more important point is the diagnosis between acute cholecystitis without stone and syphilitic cholecystitis. Riedel is of the opinion that generally primary cholecystitis is a mild affection, and does not call for surgical interference. He bases this opinion upon the large number of cases in which adhesions are found at operation or autopsy, around the gall-bladder, saying that it is not likely that all such adhesions could be explained by the inflammation produced by a gallstone which had passed out *per vias naturales*.

He has seen one case, however, of acute gangrenous cholecystitis in which only prompt operation saved the child's life, and it is important not to overlook the existence of this form in the differential diagnosis of inflammation of the gall-bladder.

It must not be forgotten in attempting to determine whether or not a cholecystitis or hepatitis is syphilitic, that gallstones, a primary pyogenic cholecystitis, or an aberrant form of appendicitis may occur quite independently in a patient with the history of syphilis, indeed with acute syphilitic manifestations in other parts of his body.

Menstrual Jaundice. The so-called menstrual jaundice first reported by Senator in 1872 is extremely rare. Indeed, since Senator's report of four cases no other instance of the condition has appeared in literature until Metzger's case in 1904.¹ The patient was a woman aged forty-five years, whose menses had begun to be irregular and whose condition suggested the onset of the climateric differing in this respect from the cases reported by Senator, whose patients were all young women with regular periods. In Metzger's case there was epigastric tenderness, sharp attack of pain in the epigastrium, and jaundice which had lasted for three weeks, when the woman first came under observation. The liver was tender but was not enlarged.

The symptoms were so severe that an exploratory operation was seriously considered. A few days later the pain and jaundice had entirely disappeared. Continued observation showed that the pain and jaundice reappeared with every menstruation, and it was evident that there was some close relation between the two conditions.

Various explanations for menstrual jaundice have been offered. Quincke suggests that it is due to hepatic congestion, but in Metzger's case the liver was not enlarged, rendering the supposition that the liver was congested improbable. Metzger believes that in some individuals menstruation is accompanied by contraction of the ducts preventing the outflow of bile.

Ascariasis of the Biliary Passages. The long worm has considerable power of forcing itself through narrow passages, and cases of jaundice have often been reported where the cause of the biliary obstruction was thought to be the entrance of the parasite into the common duct. However autopsies which confirmed the possibility of the occurrence have been comparatively rare. Vierordt² reports a case of a two-year-old child with jaundice, diarrhoea, fever, and vomiting and passing of worms. When seen two months after the onset of symptoms the abdomen was swollen and there was tenderness over the liver, which was enlarged and

¹ Zeitschrift f. klin. Medizin, 1904, Bd. liii., p. 149.

² Samml. klin. Vorträge, June, 1904.

painful. There was no eosinophilia or leukocytosis. Soon a hard, movable tumor was discovered in the left hypochondrium which was thought (and rightly so, as it proved) to be the enlarged head of the pancreas. The clinical picture suggested an ascaris abscess of the liver and ascarides in the biliary passage and pancreatic duct.

Operation showed two furuncle-like spots upon the under surface of the liver, but no pus was obtained. Death occurred shortly afterward. Autopsy showed ascarides in the common and hepatic ducts, which were enormously dilated and occluded with worms. The smaller ducts in the liver itself were dilated and surrounded by necrotic liver substance. The pancreatic duct was also occluded and the substance of that organ showed considerable necrosis.

Ebstein¹ recently reported the case of a woman who suffered from symptoms of biliary obstruction and infection until she passed several worms, one of which showed a deep constriction near its head, as if it had been lodged in a narrow canal.

The patient recovered completely and had no recurrence.

In a case reported by Pond² there were attacks resembling gallstone colic with jaundice and an enlarged and tender liver. There was no fever. The passage of worms suggested the real source of the trouble, which had been diagnosed as gallstones. After an anthelmintic the patient recovered completely.

Disinfection of the Biliary Passages. In PROGRESSIVE MEDICINE for December, 1904, I referred to a paper by Kuhn in which it was suggested that it might be possible to disinfect the bile and biliary passages by the internal administration of drugs which were secreted through the liver.

Kuhn showed that salicylic acid, menthol, and thymol were the most efficient of the antiseptics suitable for this purpose.

Recently³ he has proven experimentally that bile secreted during the internal administration of these three drugs ferments more slowly outside the body and to a less degree, depending upon the character and dose of the drug used. This antifermentative action needs a day or so for its establishment.

These last experiments of Kuhn show that salicylic acid and its salts are the most active agents in delaying biliary fermentation.

Since the appearance of Kuhn's first article a preparation of salicylic acid, with various oils, menthol, and thymol, has been put upon the market under a proprietary name. Sufficient time has not elapsed to thoroughly test the remedy clinically.

¹ Deutsches Archiv f. klin. Medizin., 1904, Bd. lxxxi., Nos. 5 and 6.

² American Journal of the Medical Sciences, September, 1904.

³ Münchener med. Wochenschrift, 1904, Bd. li., No. 33.

Personally, I have had the opportunity of observing a number of cases in which an attempt was made to disinfect the biliary passages by its use, and have not seen any benefit result. Possibly the cases were too far advanced to be influenced by such means, and that the remedy will give more positive results in earlier stages of infection of the bile-ducts, or as a preventive of infection in attacks of cholelithiasis.

Jaundice from Lactophenin. Laache¹ reports a series of 20 cases of rheumatic affections treated by lactophenin. Nine of these developed icterus after the administration of 27 gm. (300 grains). Bile was present in the urine in all the patients and absent from the stools in 7. However, in 2 cases the feces were colored by bile, showing that icterus from this cause is not necessarily of the obstructive type.

Intrahepatic Cholelithiasis. The formation of gallstones in the smaller branches of the hepatic ducts within the substance of the liver is a matter of considerable importance clinically as well as pathologically.

Such little calculi can be discharged into the bowel or can wander into the gall-bladder and there form foci for larger stones, or more important still, they may pass into the common duct and grow larger there.

Inflammatory changes in the liver tissue about the ducts usually develops in cases of any standing, a condition that simulates cholangitis of the larger ducts. The possibility that small stones may form in the intrahepatic duct and pass downward probably has much to do with the reappearance of gallstone symptoms in cases in which the gall-bladder has been opened and drained.

Beer² found cholelithiasis 72 times in 250 livers, and intrahepatic stones 6 times. There was closure of the duct and secondary cholangitis in all of these 6 cases. He explains the formation of the calculi by (1) obstruction to the flow of bile; (2) a primary cholangitis, and (3) some unknown factor, because the first two conditions are not always complicated by the formation of intrahepatic stones.

The Effect of the Carlsbad Cure upon Gallstone Disease. Link³ has followed 263 cases of cholelithiasis through their stay at Carlsbad, making careful examinations at the beginning and end of the cure. He found that enlargements of the gall-bladder subsided in the majority of the cases. Enlargements of the liver were not affected in seven-ninths but were decidedly reduced in the other two-ninths. A decided beneficial result was noted in 91 per cent. of his series.

Cases with a very prolonged course, severe infection of the ducts, and chronic jaundice were not improved by the cure.

¹ Deutsche med. Wochenschrift, 1904, xxx., No. 49.

² Archiv f. klin. Chirurgie, 1904, Bd. lxxiv. p. 115.

³ Münchener med. Wochenschrift, 1904, Bd. li., No. 30.

Hypernephroma of the Liver. De Vecchi¹ describes a neoplasm of the liver consisting of tissue that was plainly suprarenal in type. Such tumors probably arise in some error in development and may be benign or malignant. Their structure resembles similar tumors in other organs.

Fatal Hemorrhage of the Portal Vein Associated with Chronic Cholangitis. Hausteens² reports the following case: The patient was a man aged forty-five years, who had had two attacks of gallstone colic with jaundice in the previous five years. He had suffered for four months with pain in the back and right side, disturbed digestion, jaundice, fever, and ascites. His abdomen was tapped and the operation was followed by the development of a large epigastric tumor. The patient died suddenly in collapse. The autopsy showed an abscess lying in a mass of firm adhesions between the hilum of the liver, duodenum, and pancreas. A branch of the portal vein had broken into this abscess cavity and from there into the duodenum. The bowel and stomach were filled with blood. The bursting of the vein was caused most likely by erosion from without produced by the abscess in the hilum of the liver, which was the result of a cholangitis.

THE PANCREAS.

The Diagnosis of Pancreatic Disease. If the pancreas is entirely removed experimentally in animals or if it is entirely destroyed in man (as in diabetes or occlusion of the duct) the following disturbances take place:

1. About one-half of the ingested albumin passes out in the stool and even a relatively great proportion of the ingested fat.
2. Emulsified fats are better digested than non-emulsified in contrast to fat digestion in achylia.
3. The significance of the amount of fat splitting is not always reliable as a symptom, since at least two other factors enter into this process, namely, the condition of the fat (whether emulsified or not) and the amount of fat splitting which has taken place in the stomach.
4. Digestion of carbohydrates is usually not affected. In cases of incomplete destruction of the pancreas, a condition that is much more common in man than complete lesions, no decided disturbance of the intestinal function takes place.

Experimentally when the smallest remnant of the gland is left in the body, intestinal digestion is not disturbed; in man also advanced interstitial pancreatitis in various degenerations and even complete closure of the duct of Wirsung may be present without symptoms of pancreatic insufficiency. Why this is so is not very clear.

¹ Virchow's Archiv, 1904, vol. clxxvii. p. 133.

² Norsk Magazin f. Lægevidensk, August 8, 1904.

Probably the succus entericus assumes all of the starch digestion and much of the proteid. It is quite certain that succus entericus possesses proteolytic ferments of its own independent of the pancreatic juice and of bacterial action. The proteolytic action of the intestinal bacteria is well recognized, and it is quite certain that such bacterial action may account for a part of the digestion of proteids that takes place in the intestine even when pancreatic juice is absent, as has been demonstrated by several observers (Brucke and Busch). Hemmeter has shown, however, that extracts from fecal matter when thoroughly sterilized and proved sterile still possessed a remarkable proteolytic and amylolytic power, and later he found that when the duct of Wirsung was ligated a ferment could be extracted from the feces which converted fibrin into peptone in an alkaline medium (therefore not pepsin). Cohnheim¹ has found a ferment in the succus entericus that has a powerful effect upon proteoses and peptone, although it has no power to break up fibrin. He has named this *erepsin*. It may complete the digestion of fibrin when this is started by some other agent, possibly bacterial action.

Practically then we can assume that almost all of the pancreatic secretion may be eliminated from intestinal digestion without disturbances arising, and consequently the diagnosis of an incomplete lesion presents the greatest difficulty.

The Diagnosis of Complete Lesions of the Pancreas. In detecting complete pancreatic lesions we have the following data to guide us:

1. Bile is present in the stools.
2. The fat is generally (not always) present as neutral fat (drops under the microscope).
3. Muscle remnants are visible to the naked eye.
4. On account of the large amount of albumin there are considerable putrefactive changes. Consequently pancreatic indigestion is much more likely to produce secondary intestinal catarrh than closure of the bile-ducts, which, as has been said, may persist for years without inflammation of the bowel.

5. The glutoid capsule method of Sahli and the presence of muscle nuclei, as suggested by Schmidt, form together a fairly reliable method of detecting experimentally the absence of pancreatic secretion.

Sahli's Glutoid Capsule Test. Sahli uses the so-called glutoid capsule, which is made of gelatin, and which has been exposed to the action of formalin gas until it is so hardened that it can only be digested by trypsin and is not affected by gastric secretion. Such a capsule is filled with iodoform. As soon as it reaches the small bowel and is digested by the pancreatic juice iodine will appear in the saliva. The source of error in

¹ Zeitschrift f. physiolog. Chemie, Bd. xxxiii. p. 451.

the method is that the hardening of the capsule is apt to be irregular and the gelatin may become so tough that it resists trypsin as well as pepsin. This would render a negative result of no value. However, if a prompt reaction takes place pancreatic secretion is present, and as a negative test for disease of the pancreas the method is of value. The glutoid capsules are hard to obtain in this country.

Muscle Nuclei Method. It has been shown experimentally upon dogs that when the pancreas is entirely removed remnants of muscle fibre pass through in the stool with their nuclei undigested.¹ Schmidt and Hemmeter have made the same observation in man in cases of complete lesion of the pancreas.

Hemmeter² found muscle nuclei in one case of pancreatic cyst with closure of the duct of Wirsung, and in one of stenosis of the duct after cholelithiasis. Both patients recovered after operation and in a few weeks no nuclei could be found. This is a very interesting and important observation.

The method is as follows: Small pieces of slightly fibrous beef are prepared in cubes of 0.5 c.c. square and hardened for a short time in alcohol. These are tied up in little silk gauze nets and are soaked in fresh water some time before using. They are recovered from the stool by straining it with a Boas sieve or by washing it through a piece of gauze over a bucket. The pieces of meat are then examined for nuclei directly by teasing in acetic acid or in doubtful cases are hardened, embedded, cut, and stained.

This method is not ideal. The presence of nuclei are not always conclusive. Thus, in serious diarrhoea the meat may be swept through the bowel before the nuclei are digested in the interior of the pieces, and so as a general rule only those cases can be considered positive in which all the nuclei are intact. When the pieces remain in the bowel longer than twenty-four hours the bacterial action may digest some of the nuclei, so the time of passage should not be longer than that period.

When neither diarrhoea nor constipation interferes with the test the presence of all of the muscle nuclei strongly suggests a severe, probably complete, lesion of the pancreas. This test, which is of value when it is positive in combination with Sahli's, which is conclusive when it shows that there is no disease of the pancreas, forms a method that should enable us to diagnose complete pancreatic lesions.

Our investigation leaves us as far as ever from a method of detecting the lesser grades of pancreatic disease and functional disorders of secretion that are infinitely more important to detect than complete lesion.

¹ Trallenfang, Inaug. Diss., Bonn, 1903.

² American Medicine, 1905, vol. ix., No. 10.

These attempts to diagnose pancreatic disease from study of the stools have so far proven of no value therapeutically. Still, the use of organotherapy in the form of the organ itself or of its extract (not of its secretions alone) may prove of value in well-established cases therapeutically and in doubtful ones may be of some assistance diagnostically.

Abnormal Stools in Pancreatic Disease. Ury and Alexander¹ have formulated what we may hope to determine concerning pancreatic secretion by the examination of the stools for fat. The normal limit of assimilation for fat must be always kept in mind. This may be quite high (7 to 10 per cent.), and the daily amount sometimes reaches 350 gm. of butter fat.

The amount of fat allowed must be measured and varied back and forth until the power of the organism to assimilate it is accurately determined.

The stools in pancreatic disease may be abnormal in three ways.

1. An increased amount of fat with diminished splitting.
2. An increased amount with normal splitting.
3. A normal amount with diminished splitting.

However the power of assimilation is, as a rule, diminished, and by varying the amount of fat allowed the patient, results of some value may often be determined provided the following conditions are present:

1. There should be no jaundice, as absence of bile may cause steatorrhœa.
2. The fat administered must not be emulsified.
3. There must not be diarrhœa, and if any is present it must be stopped by opium.
4. The digestibility of the fat administered must be considered. Thus, it has been determined that when the same amounts of stearin, mutton fat, and olive oil are ingested the loss in the feces of the first will be 86 to 91 per cent.; of the second, 7.4 to 9.15 per cent.; of the third, 2.3 per cent. (Hemmeter).

As in other methods of investigation of pancreatic disease there are many sources of error to confuse and discourage us. Steatorrhœa may occur in disease of the small intestine with diminished absorptive power, and fats may be diminished in the stools in diseases in which some pressure interferes with the flow of fat through the bowel, such as enlarged mesenteric glands or tuberculous peritonitis. On the other hand, there may be complete destruction of the pancreas or obstruction of its ducts, and yet perfect fat digestion.

The discharge of large quantities of liquid fat after a solid stool is perhaps more significant than any of the other conditions mentioned,

¹ Deutsche med. Wochenschrift, 1904, Bd. xxx., Nos. 36, 37.

and Ury and Alexander consider it almost pathognomonic of pancreatic disease. Another important symptom is the passage of a relatively large amount of solid feces.

Nobel has laid considerable stress upon an excess of putrefaction in disease of the pancreas, but Ury and Alexander found the aromatic oxyacids normal in their cases.

The Pancreatic Reaction in the Urine. The reaction devised by Cammidge and Robson,¹ from which so much was expected by its originators, has apparently not been very well received. No reference to it has appeared in medical literature during the past year.

I have used it occasionally in my laboratory at the Presbyterian Hospital and have followed it when employed in other hospitals. It does not appear to be as reliable as Cammidge and Robson hoped that it would be, and I am afraid in its present form will not be a very useful clinical method.

Chronic Pancreatic Degeneration in Arterial Sclerosis. Hoppe-Seyler² has studied the clinical and pathological features of arteriosclerotic diabetes and has investigated many cases with pronounced pancreatic changes.

These lesions are due to vascular changes, especially arterial sclerosis, which are followed by atrophy of the pancreas.

In diabetes the islands of Langerhans are especially affected, although the secretory epithelium is much degenerated also. Hoppe-Seyler has named the condition pancreatitis interstitialis angiosclerotica.

THE PERITONEUM.

Pseudoascites. Of the various conditions that may simulate free fluid in the peritoneal cavity perhaps the most difficult to distinguish from true ascites is the so-called pseudoascites in children described by Tobler.³ The condition is produced by the presence of fluid in the distended small intestine with an elongated mesentery. This will cause dulness in the flank when the child is lying upon its back, which moves with changes of posture like free fluid and also gives a wave of fluctuation similar to true ascites.

The affection occurs in children, especially girls, between two and a half and nine years, and is characterized by irregular and recurrent attacks of diarrhoea which may last for months, while the abdomen gradually increases in size. Rachitis is frequently associated with the disease and it may be complicated during its course by tuberculosis of

¹ PROGRESSIVE MEDICINE, December, 1904, p. 114.

² Deutsches Archiv f. klin. Medizin., 1904, Bd. lxxxi. p. 119.

³ Ibid., Bd. lxxx., Nos. 3 and 4.

the bones and joints, enlarged lymphatic glands, and malnutrition. Usually there is no fever and few subjective symptoms except occasional abdominal pain. The abdomen is usually distended often to such an extent that the umbilicus is obliterated, the veins distended, and the skin shiny and thin. At other times, but more rarely, the abdomen is relaxed and doughy. Under these conditions a splashing in the intestines can sometimes be elicited. Undulation simulating true fluctuation can generally be detected under both conditions—namely, when the abdomen is distended, as well as when it is relaxed. This sense of fluctuation is most easily obtained when the abdomen is distended and the amount of fluid is considerable, as shown by a large symmetrical area of dulness. However, the impulse is not felt above the areas of dulness, as it sometimes is in true ascites.

The condition most likely to be confused with pseudoascites is chronic exudative peritonitis, especially of the tuberculous variety. In the latter there is fever and severe pain and a constant tendency to grow worse. While in pseudoascites the course is irregular and intermittent with exacerbations, the subjective symptoms are insignificant and the physical signs are variable. The character of the bowel movements are different in the two conditions. In tuberculous peritonitis the stools are thin, infrequent, and watery, while in pseudoascites they are large and frequent. The peritoneum is usually entirely uninvolved in pseudoascites.

Peritonitis following Tonsillitis. Inflammation of the peritoneum generally arises from extension of some infectious process in one of the abdominal viscera, but rarely it is a purely hæmatogenous infection. In the latter case it is metastatic in type and the bacteria are brought from some other part of the body.

Künzel¹ reports a case where the tonsils appeared to be the point of entrance of the infecting micro-organism. A woman, aged eighteen years, came into the hospital in an unconscious condition and died in three hours. The autopsy showed a purulent peritonitis. The only point of origin for the infection that could be discovered were the inflamed tonsils. The streptococcus pyogenes was found in the exudate, both in the peritoneal cavity and in the tonsils.

Künzel offers as an explanation for the selection of the peritoneum as the place for metastatic infection that there might have been a small amount of fluid in the peritoneal cavity that was a suitable medium for the growth of the bacteria. However that may be, the case shows that the peritoneum may be the seat of metastatic inflammation, and confirms what we knew before, that the tonsils are a favorite place for the entrance of bacteria into the blood stream.

¹ Münchener med. Wochenschrift, 1904, Bd. li., No. 43.

GENITOURINARY DISEASES.

BY WILLIAM T. BELFIELD, M.D.

THE KIDNEYS.

THREE phases of renal surgery are in process of evolution: first, the determination of the functional activity of the separate kidneys by various methods—cryoscopy of the blood, of the urine, the elimination of colored substances, the use of the cystoscope and ureter catheter, the so-called bladder divisors or urine segregators, and various combinations of these separate methods.

The second phase of renal surgery requiring review is intimately associated with the first: namely, the proper status of nephrectomy, especially for tuberculosis of the kidney. The third is the determination of the value of the relief of intracapsular tension of the kidney, whether by decapsulation, division of the capsule, or nephrectomy, as a cure for the manifold lesions of the kidney and its pelvis comprised under the elastic designation "nephritis."

Determination of the Functional Activity of the Separate Kidneys. NEPHRECTOMY FOR TUBERCULOSIS. On the value of methods for this purpose the past year has furnished expressions from authoritative German, French, and American sources. It was one of the subjects for formal discussion at the meeting of the German Surgical Society and later of the French Urological Association. At the former meeting the debate was opened by Rovsing,¹ by appointment. He stated emphatically his repudiation of urine separators of all kinds, and was equally emphatic in his testimony as to the value of the cystoscope and ureter catheter, to whose employment he ascribes the great improvement in his operative results, such as the reduction of the mortality after his nephrectomies from 13 to 3.3 per cent.; not a single death has occurred from insufficiency of the unoperated kidney since he began the use of the ureter catheter as a preliminary precaution.

His opinions are based upon 112 nephrectomies personally performed and observed after operation. His analysis of renal tuberculosis proceeds in this way: having determined by the ureter catheter that the other kidney is healthy, he asks how extensive must the tuberculous process

¹ Archiv f. klin. Chirurgie, Bd. lxxvii., Heft 1.

be in the kidney under examination to warrant its extirpation? Some surgeons, including Israel, rely upon the proven possibility that small tuberculous foci in the kidney may heal under hygienic treatment, and abstain from operation in such cases. Others, like Küster, remove the diseased parts by resection when these foci are small. Rovsing belongs to the much larger group of surgeons who think that every tuberculous kidney should be removed, provided its fellow is healthy.

TREATMENT OF VESICAL TUBERCULOSIS. The second preliminary question is, Does the spread of the tuberculous process to the bladder constitute a contraindication to nephrectomy? Formerly his answer was no, if the bladder lesions were small; yes, if they were large. For he has in five cases seen small tuberculous foci of the bladder heal spontaneously after the removal of the kidney which contained the infecting focus; while in all cases of extensive bladder tuberculosis secondary to renal infection, the patients formerly died of exhaustion sooner or later after the removal of the kidney, in spite of Roentgen rays, the Finsen light, pyrogalllic acid, sublimate injections, etc.

Latterly, however, he has learned to cure these vesical infections; he injects 100 c.c. of a 5 per cent. *watery solution of carbolic acid*, warmed to 38° C. (100° F.), into the bladder; five minutes later this is removed by catheter and a second similar injection is made. The injection is repeated two or three times until the solution returns free from turbidity. This treatment is repeated every second day, until the urine becomes clear and the cystoscope shows that the ulcers are healed. Surprisingly soon—after within two or three weeks—these ulcers are replaced by smooth scars.

These successes have extended the scope of nephrectomy in his hands for the cure of urinary tuberculosis; since he no longer considers bladder tuberculosis, however extensive, a contraindication to the operation.

Of 47 cases in which nephrectomy was done for renal tuberculosis, 23 had bladder infection also. In 5 of these the vesical infection was mild and healed spontaneously; in 18 it was extensive. In the first 7 of these he endeavored to cure the vesical disease by injections of sublimate and pyrogalllic acid solutions, curetting, the x-ray, and other means without success; everyone of the 7 patients died sooner or later of the disease. The remaining 11 patients were treated with carbolic acid injections as above described; 10 of these were definitely healed and the eleventh greatly improved.

SIGNIFICANCE OF GENITAL TUBERCULOSIS. The important question, Does genital tuberculosis contraindicate nephrectomy for the kidney infection? Rovsing answers distinctly in the negative. Of his 47 nephrectomies, 24 subjects were men, of whom 10 presented tuberculosis of the genitals also, 4 bilateral. In these 10 he removed the epididymes

or testes at the time of the nephrectomy. One died after the operation—the autopsy showing extensive disease of the second kidney, the ureter catheter being at that time but little used; the remaining nine patients are entirely well, though three of them had tuberculosis of the bladder, as well as of the kidney and the testicle.

THE VALUE OF CRYOSCOPY. Rovsing considers cryoscopy of the urine as well as of the blood entirely unreliable; he has seen the urine freeze at the normal point, although there was advanced disease of both kidneys; and, conversely, urine from normal kidneys has been observed to show an abnormally low freezing point.

VALUE OF EXCRETION TESTS. As methylene blue and indigo-carminé easily filter through certain diseased kidneys, their appearance in the urine cannot be accepted as a basis for operation.

While the phloridzin test seems fairly reliable when positive—*i. e.*, the author has never seen the sugar excretion by an extensively diseased kidney, yet it is entirely unreliable when negative, since the healthy kidney sometimes fails to excrete sugar after phloridzin ingestion. Thus, Rovsing has made nine nephrectomies, including five for tuberculosis, when the phloridzin test was negative, indicating that the opposite kidney was diseased; yet in 8 of these cases complete and immediate recovery followed.

VALUE OF UREA EXCRETION. The normal urea output shows a reliable kidney; yet the converse is not true, since in 31 of his 112 cases the urea excretion from the opposite kidney was distinctly below normal, yet the kidney excreted normally after the removal of its fellow.

Among 112 nephrectomies there were 9 deaths, or 8 per cent. Prior to 1901 the ureter catheter was not much used; during this period Rovsing made 52 nephrectomies with 7 deaths, or 13.2 per cent.; since 1901, with constant use of the ureter catheter, he has performed 60 nephrectomies with 2 deaths—that is, 3.3 per cent. Kümmell, using the phloridzin and cryoscopy tests, reduced his mortality from 33 to 6.4 per cent., and ascribes the improvement chiefly to these tests; Rovsing has achieved 3.3 per cent. mortality, though disregarding these tests; and these two deaths were in nowise the result of insufficient function of the remaining kidney.

Rovsing's conclusions are:

1. Death from insufficiency of the opposite kidney need not be feared when the ureter catheter is intelligently used.
2. Functional integrity of the kidney cannot be determined by any of the so-called functional tests, for the temporary function is no measure of the functional ability of the normal kidney. This organ's activity may be temporarily reduced, especially by disease of the sister kidney.

3. The improvement in results is to be ascribed neither to cryoscopy nor to the phloridzin test.

4. Blood cryoscopy is absolutely worthless and misleading both ways.

5. The phloridzin and urea excretion tests seem to be reliable when positive, but unreliable when negative; the urea test is much the less deceptive of the two.

6. Improvement in results is due to the routine use of the ureter catheter and the examination of the separate urines.

When the urine from the sister kidney is free from albumin, blood, and microbes that kidney may, as a rule, be relied upon to perform the full renal function after the removal of its fellow; while pus and microbes in the urine of the second kidney usually prohibit nephrectomy upon the first. Albumin in the urine of the second kidney without pus and microbes means simply blood intoxication from the diseased organ and is a strong indication for the prompt removal of the latter.

This interpretation of the findings from the second kidney is well illustrated in 8 of the author's nephrectomies for tuberculosis, in each of which the urine from the second kidney contained albumin. In 3 of these the functional tests indicated integrity of this kidney, and although the urine of each contained tubercle bacilli, nephrectomy was performed; all three patients died within three weeks. In the remaining 5 cases the second kidney furnished urine containing albumin but no bacteria nor pus; and although cryoscopy and the phloridzin tests indicated impairment of function the opposite kidney was removed and all five patients recovered.

In the few cases where the ureter catheter cannot be introduced Rovsing explores each kidney through a lumbar incision prior to nephrectomy; and while admitting the inaccuracies incidental to such exploration, he relates an instance in which its possible value was demonstrated.

Israel's¹ great experience leads him also to place little reliance on the so-called functional tests. Among other objections he cites one which applies also to the ureter catheter as generally used—namely, that the time during which the renal function is under examination is too brief to warrant the acceptance of the result as an index to the functional status of the organ. However, the ureter catheter does at least prove the existence of the second kidney—and this is more than can be affirmed of the various urine segregators, which he unqualifiedly condemns. He thinks that in some cases the exposure of the opposite kidney is justified for the determination of its integrity.

Casper² naturally expressed complete reliance on the ureter catheter as a means for securing positive information; and was inclined to consider

¹ Archiv f. klin. Chirurgie, Bd. lxxvii., Heft 1.

² Ibid.

cryoscopy as a valuable addition to our sources of information. As evidence to this effect he stated that since the general introduction of the functional tests the statistics of five different surgeons show a mortality of 10 per cent. of 130 cases of nephrectomy for renal tuberculosis; while prior to that time the same surgeons lost 21.7 per cent. of 139 cases of the same operation for the same cause.

Moreover, in the earlier period 22.7 per cent. of the mortality was ascribed to insufficient functional activity of the remaining kidney; while since the introduction of these tests only 7.7 per cent. of the mortality was due to this cause. The improvement in results was, however, to be credited to the ureter catheter rather than to cryoscopy.

Kümmell, Kapsammer and others urged the value of cryoscopy; while Cohn (physiologist) explained that cryoscopy of the blood could not determine the functional activity of the kidneys, since the blood concentration is the resultant of many contributing factors, of which the renal activity is but one.

The urine separator of Luys was commended by Frank; Kocher also regarded it as valuable when its results were positive.

In the discussion by the French Urological Association, Rafin stated that he had lost 3 out of 20 nephrectomies for tuberculosis; in 2 of these the results of catheterism of the ureters had been a warning against operation; in the third, separation of the urines by either catheter or divisor had been impossible because of the limited vesical capacity. In all 3 death resulted from functional incapacity of the remaining kidney.

In the remaining 17 cases the ureter catheter had given information which warranted the belief in the capacity of the opposite kidney; and this belief had in every case been justified by the recovery of the patient.

Legueu had used the ureter catheter as a preliminary diagnostic measure in over 20 cases of nephrectomy, and had lost only 1 of them.

Albarran said he had done 57 nephrectomies for renal tuberculosis, of which only 2 had died. In these 2 cases he had had no opportunity to study the separate urines from the respective kidneys obtained by the ureter catheter. He had lost no case in which such study had been made; he regards this measure as an essential preliminary to operations involving the renal integrity, and believes that this is now a generally accepted tenet.

As to the so-called functional tests, he has tried on each of 20 patients, suffering from various surgical diseases of the kidney, two or more tests, including the elimination of colored substances, of phloridzin, cryoscopy of the blood, and the usual analysis. In 10 of these cases there was essential accord between these tests and the state of the kidney; in the remainder serious discrepancies between the tests and the facts were observed. He also found that the tests indicated great variations

of the renal activity of the same patients on different days—variations which found no corroboration by the usual methods of examination.

He has concluded that *but little reliance should be accorded any cryoscopic formula*; and he does not know any one reliable method for determining the renal integrity; yet he is inclined to attach importance to a concordance of results by several methods.

Berg stated that to avoid the use of the ureter catheter he has used the *indigo-carmin test* of the elimination by the respective kidneys—observing the appearance of the color at the ureteral orifice through the cystoscope with eminent satisfaction.

Czerny, speaking by invitation, stated that he placed much reliance on this test; he injects $\frac{1}{4}$ c.c. of a 4 per cent. solution of indigo-carmin into the muscles; in ten minutes the blue urine can be observed by the cystoscope to issue from the ureteral orifice when the kidney is functioning properly, the excretion ceasing in about two hours. It has the advantage over methylene blue that no chromogenic substances are produced.

Albarran and Casper expressed the opinion that this method should be limited to those occasional cases in which the ureter orifices cannot be recognized.

Albarran's *opinion of the divisors* is indicated by his mention of a case in which he had used the Luys instrument, which furnished normal urine from the right kidney, none from the left; on the following day Cathelin used his own device, with an identical result. Albarran then catheterized the left ureter, giving vent to a large amount of purulent urine. Cathelin's assertion, based on the results furnished by his own instrument, that the normal kidney may for hours fail to secrete, does not find credence with Albarran.

ON THE DETECTION OF NEPHRITIS. Cabot¹ furnishes a comparison of the postmortem findings with the antemortem diagnosis of kidney conditions in all cases of acute and chronic nephritis autopsied at the Massachusetts General Hospital since 1893. His summary of these observations is noteworthy, especially because of his known experience in the refinements of microscopic diagnosis. He concludes:

1. Many cases of acute glomerular nephritis cannot be recognized by any clinical methods now practised.

2. In some cases of subacute and chronic glomerular nephritis diagnostic means are also defective; but in the great majority the postmortem findings were anticipated by the clinical. "Our success in the diagnosis of chronic glomerular nephritis is almost as constant as is our failure in the acute cases."

3. In chronic interstitial nephritis our diagnostic ability stands between

¹ Journal of the American Medical Association, 1905, Nos. 11 and 12.

that in acute and that in chronic glomerular nephritis. Correct diagnosis was made in about one-third of the cases.

4. Implicit reliance upon urinary findings leads to mistaking for nephritis the senile and arteriosclerotic changes, as well as to mistaking passive congestion and acute degeneration for acute nephritis. "Even in cases where no lesions are to be found at autopsy the urine is occasionally highly albuminous and full of casts."

5. In an ordinary urinary examination common errors are: (a) an attempt to estimate urea without an accurate knowledge of the patient's metabolism; (b) the assertion that small mononuclear cells are necessarily derived from the tubules.

6. Cryoscopy and other attempts to test renal permeability are as yet incapable of supplementing the older methods.

"The vast majority of estimations of urinary solids, including urea, are, in my opinion, a waste of time." "The attempt to estimate the anatomical condition of the kidney by the measurement of albumin and the search for casts is fallacious in the extreme."

The most reliable data about the urine are those most simply and quickly obtained—the twenty-four-hour quantity, specific gravity, and color.

Summary of Opinions. The overwhelming weight of opinion is then that the modern so-called functional tests, including cryoscopy, phloridzin, and pigment excretion, cannot in their present stage of evolution be relied upon to indicate the functional capacity of the kidneys; that they must be regarded at best as but supplementary to the standard analyses with test-tube and microscope, and in no sense worthy of consideration when opposed to these latter.

For the surgeon who contemplates operation on a kidney it is essential that the urine be procured from each kidney through the ureter catheter for differentiation and for information as to the functional capacity of the opposite organ. In these cases in which ureter catheterism is impossible the inspection of the ureter orifices through the cystoscope during the elimination of indigo-carmin or other pigment seems to be regarded as the best substitute.

The various bladder divisors or urinary segregators have become so notoriously unreliable that they are generally regarded as worse than useless. At best they may be considered, when controlled by the cystoscope, as a poor substitute for the ureter catheter when for any reason the latter cannot be introduced.

Nephrectomy for Tuberculosis. The propriety of nephrectomy for tuberculosis of the kidney was also discussed by both the German surgical and the French urological associations.

There was practical unanimity of opinion and practice; it was agreed

that renal tuberculosis when not operated on was usually fatal, and that the removal of the diseased kidney was the only operation worthy of consideration—nephrotomy and resection of the kidney having been definitely abandoned.

Thanks to the accuracy with which the functional condition of the opposite kidney can be determined by means of the ureter catheter, the immediate results of nephrectomy for renal tuberculosis have become surprisingly good; the operative mortality, which eight or ten years ago was from 20 to 25 per cent., now ranges from 3 to 10 per cent. Casper's figures show a reduction from 22 to 10 per cent. by the same five surgeons since the general use of the ureter catheter, this mortality including all cases dying within six months of operation from any cause.

The treatment generally adopted for renal tuberculosis is, then, the removal of the diseased kidney, after preliminary determination of the functional integrity of the opposite kidney through the examination of urine obtained by means of the ureter catheter.

Surgical Treatment of Nephritis. The treatment of various kidney lesions loosely designated "nephritis" by incision of or separation of the renal capsule, is still the subject of investigation. It now seems evident that the anatomical changes commonly understood by the term chronic nephritis—those changes caused by toxins circulating in the blood and derived from the tissues—are not susceptible to improvement by nephrotomy or decapsulation. The hypothesis that the latter operation would be beneficial by providing a new and curative circulation through new anastomoses, irrational in theory, has been definitely dispelled in practice and in the laboratory. Among the later proofs furnished is the work of Thorndike;¹ he found that decapsulation of the kidneys in animals was followed by the formation of a new and firm capsule of cicatricial tissue, and that the collateral circulation was not appreciable.

The renal lesions that have been frequently benefited by these operations are (1) those due to malposition of the kidney, with consequent disturbance of circulation and nutrition, and often with secondary infection; Edebohl's long list of successful cases is composed largely of these. In such cases the cure seems due not to relief of tension nor collateral circulation, but to the restoration of normal circulation and nutrition following the institution of the normal anatomical relations. (2) The condition commonly termed "hemorrhagic nephritis"—etiology more or less speculative—has frequently been symptomatically cured by either nephrotomy, splitting of the capsule, or decapsulation. The curability of these cases, formerly known as "essential renal hæmaturia," by an exploratory nephrotomy, was well recognized long before Harrison and

¹ Boston Medical and Surgical Journal, April 6, 1905.

Edebohls proposed the rather theatrical term "surgical treatment of nephritis." In these latter days cases of this sort cured by decapsulation are reported in such manner as to give the impression that decapsulation is a distinct therapeutic advance. Thus Nicholich reported to the French Urological Association¹ the case of a man, aged thirty-six years, who had suffered from nephralgia and hæmaturia for a month, and had developed general œdema; the ureter catheter showed the hemorrhage to be bilateral. After medicines and diet had failed to furnish relief, decapsulation and nephropexy of the right kidney was performed; two days later the urine was free from blood, and a month afterward the patient left the hospital cured.

Legueu reported the surgical treatment of 3 cases of hemorrhagic nephritis of which hæmaturia was the sole symptom ("*essential renal hæmaturia*"). One case is noteworthy as presenting a sharp contrast with that of Nicholich above noted.

Legueu's patient was a woman, aged twenty-five years, who had had hæmaturia continuously for four years, without other symptoms. The ureter catheter repeatedly showed the hemorrhage to be bilateral. The left kidney became painful and was decapsulated. A year later the urine still contained blood, which, however, issued from the right kidney only—indicating, the reporter adds, the benefit of the operation.

It would seem that, with our present information, decapsulation and "the surgical treatment of nephritis" accomplish nothing more than nephrotomy for essential renal hæmaturia and pyelitis.

Treatment of Chronic Nephritis by Lavage of the Renal Pelvis. Irrigation and drainage of the renal pelvis through the ureter catheter in cases of pus infection of this surface (pyelitis) have been extensively employed since the pioneer work of Casper, Albarran and others. Ayres² thinks the method capable of great benefit in cases of chronic nephritis, especially the parenchymatous form. He reports the treatment of 46 such cases in this way; in all but 8 (six of which were still under treatment) tube casts and albumin had disappeared from the urine. Of the 38 cases all showed tubular epithelium and 22 showed more than a trace of albumin. Of 12 cases of advanced nephritis, 3 (of the parenchymatous form) were markedly improved; 3 cases of interstitial nephritis were less favorably influenced, and 2 cases that had been decapsulated without benefit were not at all benefited.

He uses silver nitrate in boric acid solution—1:8000 gradually increased to 1:2000—injecting but small quantities (1 drachm, for example) at a time.

The prevalent conception of chronic parenchymatous nephritis—that

¹ Proceedings, p. 667

² Medical News, July 1, 1905.

it is due to blood intoxication—is difficult to reconcile with a conception of cure by lavage of the renal pelvis.

Movable Kidney. The reaction against promiscuous operation for the relief of movable kidney and the limitation of this operation to suitable cases has become notable. Treves¹ reports that he has treated 300 cases of movable kidney by mechanical support and without operative measures, and expresses the opinion that suturing the kidney should be a rare operation. Israel took essentially the same position four years ago. McWilliams² reviews 61 cases treated surgically in a New York hospital, and concludes that most of them were not benefited by operation. Balch and Torbert³ review the cases operated at the Massachusetts General Hospital from 1890 to 1904, and considers that 28 of the 86 cases were relieved.

Aaron,⁴ who two years ago reviewed 442 cases of movable kidney, treated without surgical intervention, shows that the surgical fixation of a movable kidney fails to relieve the dyspeptic and nervous symptoms incidental thereto, because the latter are due not to abnormal mobility of the kidney but to the prolapse of other viscera, notably the stomach. The kidney is normally movable and abnormal only when palpable; to fix it is to induce an abnormal condition.

The important clinical item is to determine whether the symptoms can be relieved by mechanical support; this information is elicited by firm pressure of the physician's hands above the symphysis, the doctor standing behind the patient. When such pressure secures relief of symptoms, a truss or band should be applied to this suprapubic region.

Renal Retention with Anuria. Watson⁵ analyzes 200 cases from the literature with his personal additions. His conclusion is that while medical treatment, including the subcutaneous injection of saline solutions, seem to have some value, the best treatment is a prompt and rapidly performed lumbar nephrotomy.

Gonococcus Infection of the Kidney. Le Fur⁶ removed a kidney containing about a litre of pus and many gonococci, the infection having apparently reached the kidney not by ascent from the urethra but by way of the blood.

Lumbar Abscess Opening into the Bladder. Cathelin⁷ reported a case in which a tumor in the lumbar region was associated with purulent urine; a diagnosis of pyonephrosis was made and operation performed. The

¹ Canadian Practitioner and Review, January, 1905.

² American Medicine, October 20, 1904.

³ Boston Medical and Surgical Journal, March 2, 1905.

⁴ American Medicine, August 5, 1905.

⁵ Boston Medical and Surgical Journal, September 15, 1904.

⁶ Proceedings of the French Urological Association, 1904, p. 753.

⁷ Ibid., p. 613.

tumor was discovered to be a lumbar abscess proceeding from Pott's disease of the spine, which had opened into the bladder. The issue was fatal.

Sloughing of the Kidney. Desnos¹ made a nephrolithotomy without untoward event; in the course of the following fifteen days necrosis and spontaneous sloughing of the kidney occurred without infection—presumably from thrombosis of unknown origin. He considers the case unique.

THE URETER.

Cystoscopy of the Ureter Orifice. The cystoscope has revealed the importance attaching to the ureter orifice as an index to morbid conditions of the ureter and renal pelvis. An excellent *résumé* of present knowledge on this subject is furnished by Tilden Brown.² The normal orifice is sometimes a pinkish slit in a low papilla of yellowish-white mucosa; sometimes a conical dimple at the apex of a more pronounced papilla; or a prominent lip at whose anterior base lies a nearly concealed but normal ureter mouth. Such openings are normal, yet they do not preclude the possibility of disease of the kidneys associated with them.

An abnormal ureter mouth may be a conspicuously gaping one, or it may be invisible. The papilla may be a distinct tumor, the color varying from a reddish opacity to a glistening white; the latter appearance results from oedema of the mucous membrane, the electric transillumination of which produces the phenomenon mentioned. While this oedema may be produced by various other causes, it is a regular result of the presence of a calculus in the lower end of the ureter. In minor degree it accompanies infections of the renal pelvis and ureter.

An irregular ulcer adjoining the ureter mouth or even usurping this area, with a surrounding hyperæmic zone and uneven base, is characteristic of the tuberculous infection which has descended from the corresponding kidney.

The discharge of pus or blood or both from either ureter is easily identified by the cystoscope; and in many cases no further information need be elicited. Many times, however, a microscopic examination of the ureter output is desirable; and this can usually be secured by introducing the short ureter catheter two inches into this duct. The long catheter, passed into the renal pelvis, determines anatomical abnormality, such as a stricture.

Among the cases of ureter catheterism examined were three of renal tuberculosis without noticeable abnormality of the ureter mouth of the

¹ Proceedings of the French Urological Association, 1904, p. 752.

² Medical News, March 11, 1905.

diseased side; yet the ureter catheter secured in each case urine containing tubercle bacilli, and the excised kidneys showed the lesions of tuberculosis. In two male patients with symptomless but decided unilateral hæmaturia of moderate duration with sterile urine, the bleeding ceased after catheterization; while this may have been a coincidence, yet it suggests the desirability of repetition in other cases of so-called essential renal hæmaturia. In another case a male, aged sixty-seven years, a persistent hæmaturia of long duration was not appreciably influenced by ureter catheterism and lavages of the renal pelvis with adrenalin solution. The postmortem section, fourteen months after the beginning of the hæmaturia, showed a hypernephroma of the bleeding kidney.

The diagnostic value of the cystoscope and ureter catheter was indicated also in a male patient aged forty years, who had excessive and continuous hæmaturia and a large tumor in the left side of the abdomen, which was considered the spleen, left kidney, or retroperitoneal tumor by different observers. The ureter catheter showed that the left urine was normal, the right very bloody. The case was one of neoplasm of the right kidney and enlargement of the spleen.

Occlusive Ureter Catheter. Nitze¹ uses and recommends an occlusive catheter for the ureter. The distal segment of a specially constructed catheter contains a small rubber balloon, which, after the catheter has been introduced into the ureter, is filled with water.

Assurance that the balloon completely occludes the ureter is secured by injecting a solution of methylene blue through the catheter into the ureter above the balloon. An ordinary catheter is then introduced into the bladder; if the urine escaping through this remains free from the blue color occlusion of the ureter is complete.

The object of this rather elaborate apparatus is to secure complete and absolute exclusion of the secretion from one kidney—the ordinary ureteral catheter offering the theoretical possibility that it may permit the escape of some urine around it into the bladder.

Periureteral Abscess. Neumann² relates a case of abscess formation around the vesical end of the ureter, which he evacuated and drained by an incision from the perineum.

Prolapse of the Ureter. The cases commonly so designated really consist of a dilatation of the vesical end of the ureter (sometimes by a calculus) and infiltration of the surrounding mucous membrane, the whole constituting a conical protrusion into the vesical cavity, capped by a crater-like orifice. Pasteau³ mentioned six such cases that had come under his observation, from two of which he had removed a ureteral calculus.

¹ Centralblatt f. Krankheiten d. Harn. u. Sexual Organe, 1905, p. 113.

² Deutsche Zeitschrift f. Chirurgie, 1905, Nos. 3 and 4.

³ Proceedings of the French Urological Association, 1904.

Casper had seen two such and showed a photograph of one, of pyramidal shape; he thinks them congenital and requiring no interference, the presence of the stone being incidental.

Albarran¹ observed true prolapse of the ureter with consequent hydro-nephrosis in a man aged thirty years. He made a suprapubic cystotomy, returned the prolapsed portion of the ureter, and stitched the bladder wall around the ureteral orifice so as to prevent recurrence of the prolapse.

THE BLADDER.

Vesical Tumors. The German Surgical Society at its meeting in 1903 appointed a committee to institute a collective investigation as to the growth of tumors in the bladders of workers in aniline dyes. At the 1904 meeting Rehm announced for this committee that the report was not yet completed. The question propounded by Küster, whether these tumors were found in parts of the urinary channel other than the bladder, could, however, be answered in the affirmative. Rehm had operated on an aniline worker for vesical carcinoma; at the autopsy carcinoma of the right kidney and ureter was found, and extensive metastases in the lymph glands of the abdominal cavity. Rehm considered the kidney carcinoma the primary growth.

Strauss and Schwerin reported cases of *carcinoma of the urinary tract in aniline workers*; in one case the kidney was involved.

Lempe demonstrated a bladder cancer removed from an ectopic bladder.

THE INTRAVESICAL REMOVAL OF BLADDER TUMORS through the cystoscope by Nitze's method was discussed by Weinrich. Of 271 benign tumors 151 were operated on through the cystoscope, with 1 death. Some of these tumors were as large as small oranges and some required twenty sittings for their removal by galvanocautery. These sittings can be given in the office without interference with business; and it is claimed—though without satisfactory warrant—that this cautery removal gives greater security from recurrence. But the broad-based malignant tumors should not be treated in this way.

Kapsammer limits this method to small tumors that can be removed at one sitting and for cauterizing ulcers; larger tumors should be removed by suprapubic cystotomy.

Treatment of Vesical Growths by Resorcin. Janet² reports a case of intravesical tumor, apparently an epitheliomatous degeneration of a papilloma, in a man aged seventy-six years; because of the malignant features

¹ Proceedings of the French Urological Association, 1904.

² Ibid., p. 535.

Guyon had advised against extirpation. Janet injected into the bladder watery solutions of resorcin, increasing in strength from 10 to 50 per cent., making five instillations of 5 c.c. each. Arrest of hemorrhage and improvement of the vesical symptoms were prompt and the result permanent.

Forgue said he had seen similar results with marked decrease in the size of vesical growths follow the injection of small quantities of Peru balsam into the bladder.

Desnos recalled his publication, several years earlier, of equally good results, including the disappearance of intravesical tumors from the intravesical instillation of methylene blue.

Congenital Diverticula of the Bladder. Two comprehensive articles on this subject have been furnished, one by Meyer¹ the other by Pagenstecher.² Each reports a personal observation and reviews the literature. About fifty such cases have been recorded; in many of them the vesical anomaly was found to be associated with malformation of the pelvic organs, and in newborn infants. Pagenstecher's patient was a man aged thirty-three years, whose symptoms had appeared about a year earlier, as frequent vesical and rectal tenesmus and vesical infection. After attempts at cystoscopy had failed, a suprapubic exploratory incision was made; a diverticulum almost as large as the bladder was found, into which the left ureter opened. Suture of the bladder wall with irrigations proving useless, the diverticulum was removed after resection of the sacrum; the left ureter was resected and implanted into the bladder. After a tedious urinary fistula finally closed ultimate recovery ensued.

Cystitis. Hofmann³ collects and attempts to analyze 147 articles on cystitis; many of them are useless because the authors failed to recognize cystitis as an infection secondary to a prior lesion; they therefore persist in treating the cystitis rather than seeking the cause thereof. Many agents are recommended for both internal and local use; only one important item is emphasized, namely, the value of the retained catheter for resting and draining the bladder.

Tuberculosis of the Bladder. Minet⁴ advises the local use of *pyrogalllic acid* solution in the treatment of vesical tuberculosis; he injects 5 c.c. of an aqueous solution, from 2 to 5 per cent., daily. He has seen no cures, but regularly observed marked diminution in the pain and frequency of urination and arrest of secondary infections. (Compare Rovsing's results from injection of carbolic acid solution.)

¹ Centralblatt f. Krankheiten d. Harn. u. Sexual Organe, 1905, p. 289.

² Archiv f. klin. Chirurgie, Bd. lxxiv., No. 1.

³ Centralblatt f. die Grenzgeb. d. Med. u. Chirurgie, 1904, No. 23.

⁴ Proceedings of the French Urological Association, 1904.

Foreign Bodies in the Bladder. Durrieux¹ observed a case in which a vesical calculus weighing 185 gm. (nearly 6 ounces) induced no subjective symptoms and was discovered accidentally; he states that three similar cases have been recorded.

Trouvé² reports a case in Guyon's clinic in which a celluloid pin was removed from a woman's bladder through a vesicovaginal incision, with immediate closure of the wound, catgut being used to unite the edges of the vesical mucosa and silver wire for the vaginal wall. Guyon has long used this incision and strongly advises it in preference to the suprapubic or symphyseal (subpubic) avenue of approach, because it is free from danger of infection and inflicts no permanent damage.

Englisch³ discusses the various methods attempted for *dissolving calculi in the bladder*, and furnishes a very interesting chapter on the spontaneous disintegration of bladder stones. He gives brief histories of 102 authentic instances of such disintegration collected from the literature, and adds four from his personal observation. He concludes that this occurs chiefly to calculi composed largely of urates.

I have personally observed a case in which a vesical calculus seen by the cystoscope to be about as large as a walnut was found six weeks later to have separated into three pieces. Six months afterward several small fragments having meanwhile been voided with the urine, the bladder and urine were normal.

Hernia of the Bladder. Plummer,⁴ operating for inguinal hernia, discovered a second sac intimately adherent to the intestinal sac; as the testicle of the opposite side was not in the scrotum, the second sac was opened, and then recognized as the bladder. The wound in this viscus was sutured, primary union resulting.

The author, discussing the general topic of hernia of the bladder complicating that of the intestine, remarks that this complication is not a rare curiosity but a frequent occurrence. That this combination so often results in a wound of the bladder is due partly to the unweariness of the surgeon and partly to the difficulty often experienced in identifying the bladder. Two features are characteristic of the complicating bladder hernia; the presence of a sac to the inner (median) side of the intestinal sac and the abundance of fat. If the surgeon were constantly mindful of the possibility fewer mistakes would be made.

¹ Centralblatt f. Krankheiten d. Harn. u. Sexual Organe, 1905, p. 109.

² Annales des maladies des organes genitourinaires, 1905, p. 1013.

³ Archiv f. klin. Chirurgie, Bd. lxxvi., No. 4.

⁴ Journal of the American Medical Association, July 22, 1905.

THE PROSTATE.

Reaction of Prostatic Secretion. Schulz¹ found the prostatic secretion in fifteen normal subjects always alkaline or amphoteric, never acid.

Echinococcus Cyst of the Prostate. Kaveczy² reports the case of a man, aged forty-six years, who repeatedly experienced retention of urine. A fluctuating tumor as large as a child's head was found between the rectum and the prostate; by puncture there escaped a clear fluid containing no albumin but many echinococcus hooklets. Through a perineal incision the sac, apparently originating in the prostate, was removed. The author states that this is the first proven case of echinococcus cyst in this locality, though Jocin collected five cases probably of this nature.

Therapy of Chronic Prostatitis. Posner,³ in discussing the therapy of the conditions clinically classed as chronic prostatitis, endeavors to extend the analogy instituted by Toldt, Robin, and Fürbringer between the prostate and the mammary glands of the female, founded upon anatomical structure (acinose glands) and chemical products (lecithin corpuscles). Bab, in Leyden's laboratory, showed that every obstruction of the mammary secretion in the ducts causes a local leukocytosis, the leukocytes absorbing the lecithin granules; the secretion is positively chemotactic to leukocytes. At the beginning of lactation after the termination of pregnancy such chemotaxis is pronounced; leukocytes loaded with fat are "colostrum corpuscles," really an inflammation (?).

Posner transfers this description to the prostate, and speculates that a "chronic prostatitis" may be quite analogous to the secretion of milk in the mammaræ with obstruction in the ducts. In support of this analogy he states that leukocytes in chronic prostatitis are loaded with fat, sometimes so overloaded as to make the prostatic origin of the leukocyte apparent, since no other leukocytes contain so many fat granules (unless fat has been introduced into the urethra as a lubricant for bougie or catheter shortly before). Stained sections of the prostate show numerous lecithin granules in the entire tubular epithelium (the source of the fatty secretion); also free lecithin granules in the lumen of the glands.

The author infers that in the prostate, as well as in the mamma, fat that is lecithin exerts a chemotactic influence upon the white blood corpuscles; in other words, that every interference with secretion suffices to call forth inflammatory processes. Hence chronic prostatitis may exist without infection; moreover, the evidences of inflammation in many hypertrophied prostates do not prove that the inflammation

¹ Wiener klin. Wochenschrift, 1904, No. 43.

² Annales des maladies des organes genitourinaires, 1905, p. 675.

³ American Journal of Urology, March, 1905.

caused the hypertrophy, as Ciechanowsky and others maintain; they suggest rather that the hypertrophy may be the primary, the inflammation the resultant lesion, even where no infection has occurred.

The author's ingenious speculations are vitiated by his failure to distinguish between "inflammation" and leukocytosis; yet because of the application of the analogy between prostate and mamma they are reproduced here.

Prostatectomy. This subject was discussed by the French Urological Association.¹ Escat presented the results of 410 cases of perineal prostatectomy; death followed in 47 cases, 11.3 per cent.; a urethroperineal or rectal fistula in 8 per cent., and permanent incontinence of urine in 3 per cent. The partial removal is more dangerous than the total prostatectomy; and the attack of the prostate from the rear surface through a curvilinear or V-shaped incision is the only method of approach meeting the author's approval or that of other French surgeons.

Escat favors perineal rather than suprapubic prostatectomy because the mortality of the latter is somewhat greater (10 to 15 per cent.).

Proust collected 813 cases of perineal prostatectomy with a mortality of 7.13 per cent. He, too, considers the partial more dangerous than the complete prostatectomy, and frankly admits that the suprapubic gives better results than the perineal operation, though at a somewhat greater risk. While neither is suitable for all cases, yet the Freyer operation without the removal of the prostatic urethra is, from the surgical standpoint, the best for general use.

Hamonic has abandoned morcellement, removing the lobes *en bloc* so far as possible. Among the remote evil results to be considered from the perineal operation are cicatricial strictures of the prostatic urethra. He avoids operation when the prostate is small and hard.

Albarran found in 39 perineal operations that the removal of the prostate was easy in 29, difficult in 7, and impossible in 3. In difficult cases there is danger of tearing through the capsule and opening the periprostatic veins; this is apt to be followed by severe hemorrhage and general septic infection. The capsule increases the difficulty of the operation, but is a guarantee of security. He has lost 2 cases out of 66 perineal prostatectomies (3 per cent.). Of 34 cases of chronic complete retention before operation followed for a year thereafter, 32 were completely successful; in 2 cases there was residual urine, amounting to a few ounces. He thinks that the failure to evacuate the bladder completely in these 2 cases was due not to the persistence of any obstruction but to the existence of a sclerosis of the vesical walls consecutive to chronic cystitis. He advises operation in all cases of chronic complete retention, unless there be special objections in individual cases.

¹ Annales des maladies des organes genito-urinaires, 1905, p. 1634.

Of 23 operations for chronic incomplete retention there were 12 complete successes and 3 failures. These latter were cases of chronic hypertrophic prostatitis which are often confounded with hypertrophy. In younger men this is cured by massage; in the old it may remain unimproved by perineal prostatectomy—in fact, the retention may be aggravated.

Albarran¹ thinks the advantage of the perineal over the suprapubic prostatectomy is the lower mortality. He is inclined to believe, however, that improvements in the technique of the transvesical operation will reduce the mortality, whereupon this will become the operation of choice, superseding the perineal as the standard operation; for, as he says, "the therapeutic results of complete transvesical prostatectomy are remarkable; in almost all the published cases one notes that the patients urinate easily and completely, being able to empty the bladder spontaneously." Furthermore, there are no permanent fistulæ, no cicatricial contractions of the vesical neck, no injuries to the rectum, no loss of sexual power following in the train of the operation. Still, the greater mortality at present constitutes a barrier that must be considered.

The improvements in operative technique which Albarran thinks possible have been supplied—though like most surgeons, he has as yet neglected them. They are chiefly (1) making the operation in two stages, and (2) anæsthesia by nitrous oxide. The two-stage operation virtually eliminates the dangers of septic infection of the suprapubic tissues, which has been the chief cause of the mortality; and nitrous oxide anæsthesia, which amply suffices for this operation, but is, as ordinarily practised, too brief for perineal prostatectomy, avoids the dangers to kidneys, heart, and lungs associated with chloroform and ether. Moreover, nitrous oxide may be safely used for several hours' continuous anæsthesia, as B. Van Hoosen has shown.

In 12 consecutive cases of suprapubic cystotomy for various purposes in men over sixty years of age, in which these improvements have been adapted, I have had no mortality.

Discussing the indications for perineal prostatectomy, Albarran ascribes his better record (3 per cent. mortality, while that of 530 cases collected by Watson was 6 per cent., Proust's 7, and Escat's 11 per cent.) to his great care in determining the contraindications to operation. Among these he enumerates (1) certain conditions of the bladder, including primary vesical atony, sclerosis of the vesical walls secondary to cystitis, and febrile infection proceeding from the bladder. The last is especially important, since he thinks that much of the operative mortality results from infections of the operative field, which are acute and

¹ *Annales des maladies des organes genitourinaires*, p. 352.

active at the time of operation. He advises that these infections be reduced by urotropin internally and vesical lavage with the retained catheter when needed, before operation be undertaken. He especially warns against performing prostatectomy in cases of chronic distention of the bladder, advising that such bladders shall be gradually emptied by the careful and aseptic use of the catheter before operation is performed.

2. The functional activity of the kidneys should be determined by the various methods now in vogue—excretion of methylene blue, cryoscopy, and the phloridzin test—to a concordance of whose results Albarran ascribes much value, though admitting that any one may mislead.

3. The general condition of the patient is of course a vital matter; yet the cachexia resulting from infections of the urinary tract is an indication for rather than against prostatectomy, provided the renal activity be maintained.

The results of his perineal prostatectomies are observed in 44 cases operated on more than a year before, and 15 cases operated on three to four and a half years earlier. Of these he considers 55 complete successes, in that they empty the bladder completely and have no occasion to use a catheter; 4 partial successes, who have less residual urine than before operation, but still require the catheter; and 3 complete failures, whose residual urine has not been decreased by operation.

He considers it noteworthy that of the 7 partial or complete failures, 5 patients had small prostates and incomplete retention. He also states that the total number of small prostates operated on was 11; of these 5 presented a median lobe, the removal of which was followed by complete success. The remaining 6 had no median enlargement, and in only 1 was complete success attained.

The author calls especial attention to this condition—which he designates “hypertrophying prostatitis,” because prostatectomy fails to relieve it, as was illustrated in the five failures just mentioned. The salient features are a small or moderate prostate without tendency to deformity of the vesical neck and without median lobe; consistence rather soft, no spenoidal bodies (adenomata); the structure is that of chronic prostatitis. The symptoms are those of partial and moderate retention, finally, after a long course, terminating sometimes in complete retention.

These are instances of chronic prostatitis; the visible obstacle to urination is absent or minimal, the retention being due to imperfect opening of the urethrovesical orifice. They are distinct from cases of true prostatic (fibroadenomatous) hypertrophy, the common form, in several clinical respects, among which is the important feature, already mentioned, that they are not cured nor even notably relieved by perineal prostatectomy.

Nicholich performed 12 perineal prostatectomies with 2 deaths, 12 Freyer's operations with 1 death; he thinks the latter is the operation of the future because more rapid, easy, and less dangerous.

In the German Surgical Society, Czerny opened the discussion on prostatectomy. He is inclined to include among the indications for operation not merely difficult catheterism but also, perhaps, the early stage of prostatic hypertrophy. He considers the perineal and the suprapubic operation satisfactory; he uses for the former Zuckerkandl's incision, but thinks it capable of improvement.

Kümmell stated that he had used various methods in 114 cases; he secured many good results from castration but none from vasectomy; Bottini's operation was very unsatisfactory. His experience with both perineal and suprapubic operations has been distinctly favorable; the unsatisfactory results have been due largely to weakness of the detrusor muscle, which is irremediable. The chief contraindication is not age, but disease of the kidney.

He has found enucleation of the prostate easy. In perineal operations the urethra should always be opened and complete removal performed; partial extirpation is poor policy.

Israel makes the suprapubic operation with perineal drainage. Nicholich and Frank also regard this as the best of the various excisions, and consider it the operation of the future.

Partial perineal removal of the prostate without injury to the urethra was advocated by Küster and Riedel.

The Bottini operation found no advocate of importance, and may be regarded as completely reinterred. May its second resurrection be long deferred.

Young,¹ formerly an ardent advocate of the Bottini operation, after an experience of 50 cases of perineal prostatectomy, now considers this the best method for relieving prostatic obstruction.

In England the perineal operation is held in far less esteem than is the suprapubic or "transvesical" enucleation. This attitude of British surgeons is in large measure due to the precept and example of Freyer, who adapted and practised Fuller's total enucleation. Our English cousins, by the way, call this procedure "Freyer's operation," though it was performed, recorded, and advocated by Fuller a year earlier; similarly they still call the original suprapubic prostatectomy "McGill's operation," though it was thrice performed, recorded, and advocated by myself before McGill made his first operation, as McGill himself frankly admitted.

At the meeting of the Medical Society of London May 8, 1905, Freyer² discussed his experience with 195 cases of suprapubic prosta-

¹ Journal of the American Medical Association, 1905, p. 337.

² London Lancet, 1905, p. 1268.

tectomy. His 110 published cases gave an operative mortality of 10 per cent.; but in the later 85 cases the mortality was reduced to 5.8 per cent. He was especially gratified to report that among these operated patients 9 were over eighty years old and 1 aged seventy-nine, all of whom recovered; 9 were still alive, with good urinary control; the tenth—carcinoma of the prostate—recovered from the operation. He remarked that age did not seem to be a contraindication to the operation, provided the functional integrity of the kidneys was preserved.

Harrison and other surgeons also expressed their preference for the suprapubic operation.

The April number of the *Annals of Surgery* is devoted to a symposium on the etiology and surgical treatment of prostatic hypertrophy. Eleven papers are comprised in the symposium; noteworthy is the earnest advocacy, by Lilienthal and Wiener, of the suprapubic operation and of nitrous oxide anæsthesia for that purpose.

Tinker¹ advises the performance of perineal prostatectomy under local anæsthesia, whereby the dangers of chloroform and ether are eliminated. He secures this by infiltration around the main nerve trunks:

"Taking the tuberosity of the ischium as a landmark, the needle of the infiltrating syringe is inserted into the skin about one inch in front and internal to the tuberosity. It is not necessary to infiltrate a large area in this region, and the weaker solution of eucaïne, 1:500, with adrenalin is used to infiltrate the skin and outer layers." Then 30 to 60 minims of a stronger solution are injected more deeply.

The region around the bladder neck is not anæsthetized by this procedure, and the author recommends that nitrous oxide anæsthesia be used for this stage.

It would seem that the latter suffices for all stages, without the disadvantages of the infiltration.

Whiteside² presented to the American Urological Association a paper entitled "Some Untoward Results of Perineal Prostatectomy," which is heartily commended for perusal by both surgeons and practitioners. He carefully analyzes several series of cases, some published in current literature and others collected by personal communications. His conclusions from this analysis of 238 cases (and 22 further cases presented in an appendix) are these:

1. Perineal prostatectomy is considered by the majority of surgeons the best operation in most cases in spite of the excellent results from the suprapubic operation reported by Freyer, Fuller, Lilienthal and many others.

2. Immediate deaths result from sepsis, shock, cardiac disease, pneumonia, and uræmia; remote deaths from cancer, cachexia, pyonephrosis,

¹ Journal of the American Medical Association, 1905, p. 471.

² Journal of Urology, July and August, 1905.

uræmia, embolism, and the results of secondary operations to overcome defects left by the first.

3. Absolutely good results occur in about 30 per cent. of all cases operated on.

4. Sequelæ are numerous and troublesome; they include rectal fistula, urinary sinus, abscess, stricture at the bladder neck, incontinence, residual urine, epididymitis, sexual impotence, cystitis, vesical calculus, and urinary tuberculosis.

5. Mistakes in diagnosis are not uncommon even in the experience of the most skilful; carcinoma, sarcoma, and syphilis have all proved stumbling-blocks.

"Is this as good as the enthusiasm of a few would lead us to suppose?" "Would you eagerly embrace an operation offering you a 30 per cent. chance of cure, a 7 per cent. or more chance of death, and, more important still, a 50 per cent. chance that you would be no better but have only exchanged one urinary difficulty for another?" "It is wrong to persuade ourselves or our patients that it is easy, safe, and sure to cure."

Whiteside's article should contribute materially to check the indiscriminate, reckless, and ignorant vogue of perineal prostatectomy which has swept the profession of this country in the last few years. Perineal prostatectomy will doubtless have a permanent place among the operative measures for the relief of prostatic hypertrophy; and when its limitations are well understood and generally observed, the untoward results now so common will be minimized.

Summary. At present perineal prostatectomy is the operation of choice in France, Germany, and the United States. It is generally admitted that it has produced a large army of sufferers from urinary incontinence, perineal and rectal fistulæ, cicatricial contractions of the bladder neck, besides various minor ailments, such as impotence and epididymitis. It is also generally admitted that the suprapubic operation entails none of these distressing sequelæ; and that the functional results secured by it are more uniformly good than are those of the perineal operation.

Why, then, is the latter generally preferred? The unanimous answer is, because of its smaller mortality.

The correctness of this answer cannot be denied; and the chief cause of the preponderant mortality of the high operation has been sepsis from infection of the suprapubic space.

It is possible, however, to reduce this mortality below that of the perineal operation by eliminating this suprapubic infection. This is accomplished by performing the operation in two stages, each under nitrous oxide anæsthesia. As above stated, I have operated in this way on twelve elderly patients without a death.

A third safeguard is the perineal boutonnière with drainage through a metal tube; this is useful also for the detection and dilatation of the sclerosis at the vesical orifice, which is so often an important factor in the retention.

A fourth protection against sepsis is packing the bladder with strips of iodoform gauze, whose ends emerge from the suprapubic or perineal wound.

By these measures the mortality from the suprapubic operation is minimized; and this operation should supplant the perineal as the routine procedure.

PROSTATISM WITHOUT PROSTATIC ENLARGEMENT. In former issues of this review emphasis has been laid upon the fact that all the symptoms commonly ascribed to prostatic hypertrophy are frequently met in patients whose prostates are not enlarged from any cause, in whom the obstruction to urination is a sclerosis, a "contracture" of the vesical neck; and that while these cases are met at all ages and even in women, they are especially common in elderly men during the period when actual hypertrophy is also common. Hence, they are usually mistaken for instances of prostatic hypertrophy and subjected to operation.

Occasionally surgeons who have made this mistake publish their experiences for the benefit and guidance of others.

Such a case is recorded by Moran,¹ who made a suprapubic incision for the purpose of removing a prostatic enlargement in a patient sixty-five years old. He found absolutely no enlargement; but the bas-fond of the bladder was very large and deep, indicating that some obstruction to urination existed. This obstruction he found in a hard, sclerosed vesical orifice, which he divided by the cautery. The patient recovered perfect vesical function.

Reynes related a duplicate of the above-mentioned case in his own experience, the patient having been unable to void any urine except through a catheter for six months prior to the operation; this revealed a sclerosis of the vesical neck without hypertrophy.

Further examples of the errors caused by the prevalent practice of regarding prostatic hypertrophy as the cause of all urinary difficulties in elderly men were furnished by Loumcan at the same meeting of the French Urological Association. He mentioned one instance in which a supposed prostatic enlargement proved to be a greatly thickened bladder; and another where excrescences perceived on rectal examination and supposed to be cancerous nodules of the prostate were found to be diverticula of the bladder.

¹ *Annales des maladies des organes genitourinaires*, 1904, p. 1523.

THE EXTERNAL GENITALS.

Resection of the Urethra. Goldmann¹ has resected the urethra for gonorrhoeal and other strictures, removing as much as 6 cm. (2½ inches) of the canal, and closing the defect successfully. He mobilizes the urethral stumps and stretches them thoroughly.

Infections of the Bulbous Urethra. Motz discussed before the French Urological Association the chronic inflammation of the glands in the bulbous and membranous urethra; the persistence of a gleet is frequently due to the infection of this region. It can be mistaken for infection of the prostatic follicles, since pus can be expressed by pressure with the finger in the rectum. Treatment should be directed to these parts of the urethra specifically.

Simple Ulcer of the Bulbous Urethra is considered by Keyes, Jr.,² in connection with the following case: A man, aged forty-four years, free from gonorrhoea and syphilis, had for three years had a slight glairy mucous discharge; for six months there had been some bleeding after urination, though the urine was free from blood; the urinary stream was tardy at the start and dribbling at the finish, though not unduly frequent. A physician had used internal remedies and injections, the latter followed by increased bleeding. Then the urethroscope revealed an ulcer in the bulbous urethra; strong silver nitrate solutions were followed by more bleeding and retention of urine, a soft catheter failing to enter.

The patient then consulted Keyes, who was unable to inspect the urethra because of the bleeding induced by the urethroscope. A 26 F. steel sound was passed; bleeding followed, but urination improved. Six days later an ulcer nearly 1 cm. long was seen on the roof of the urethra at the bulbomembranous junction; the same sound again caused bleeding. Eight days later a 29 F. sound caused bleeding for ten hours, but none occurred thereafter.

Keyes regards this condition as similar to an anal fissure, and, like the latter, cured by overdistention. He collects 24 personal cases similar to this except for the bleeding; the symptoms are usually these: A neurotic or overworked patient has frequent urination by day but not at night, and a dull, hypogastric ache which is relieved by urination, the latter being often imperative. The urine is clear or contains a mucopurulent cloud. The passage of a large sound produces distinct improvement and often excites bleeding. Relapses are not uncommon.

While one may hesitate to accept an ulcer or fissure of the bulbous

¹ Beiträge zur klin. Chirurgie, Bd. xlvii., No. 1.

² American Journal of Urology, March, 1905.

urethra as the usual cause of these symptoms, the clinical picture and the relief of symptoms by large sounds are familiar phenomena.

Circular Constriction of the Penis with resultant fistula is reviewed by Veau¹ in reporting a case. Falconnet collected 16 such cases, mostly in children and imbecile or insane adults. The important clinical feature is that the oedema caused by the constricting agent, such as a ring, may conceal the latter for weeks.

Suppuration of the Testicle is the subject of an extensive article by Dalous,² dealing with the etiology and especially with the pathological histology. He advises that the quickest and surest cure for any non-tuberculous infection of the epididymis is total and systematic epididymectomy.

Direct Medication of Seminal Vesicle Infections is described by Belfield.³ Pus infections of the genital tubes in the male are common; the gonococcus infection, when it invades the epididymis, frequently produces suppuration along the entire genital canal and a small abscess in the epididymis; the latter may be affirmed whenever an acute epididymitis is accompanied with hydrocele and scrotal oedema, and often exists without these incidental symptoms. The logical and, as events prove, the successful treatment consists of incision and drainage of the suppurating epididymis. The vas deferens is accessible through such an incision. After demonstrating on the cadaver the feasibility of the plan he introduced a hypodermic needle into the lumen of the vas and injected various solutions along that canal into the seminal vesicle. This organ can then be emptied by digital massage through the rectum and additional injections made.

It was found too that such irrigation of the vas deferens and seminal vesicle were useful in the treatment of chronic conditions resulting from infections, including some cases of gleet. The one precaution to be observed is to avoid overdistention of the vesicles, since this may induce a painful spasm:

The objection to this treatment is that the vas deferens must be exposed by means of a small incision, which can of course be made under local cocaine anæsthesia. While this seems a drawback, yet it is a trivial one when the benefits to be secured are taken into consideration, together with the fact that the seminal vesicle cannot be medicated directly in any other way, severe operations excepted. The fact that gonorrhœal and other pus infections of the male genital tube—unlike pus tubes in the female—rarely result in death or permanent disability, is doubtless the reason why the nominal treatment by medical means only has here-

¹ *Annales des maladies des organes genitourinaires*, 1904, p. 1417.

² *Ibid.*, 1905, p. 984.

³ *Journal of the American Medical Association*, 1905, p. 1277.

tofore prevailed. Yet the male subject of pus tubes suffers serious distress and functional derangements, including gleet, perineal, rectal, and suprapubic pain, irritation of the bladder, sterility, and impotence; and a method of treatment which offers an excellent opportunity of eradicating these infections of the genital tube and the consequences above enumerated will doubtless be welcomed even though it requires a slight incision through the skin.

X-ray Treatment of Tuberculous Testicle. De Garmo¹ reports a case of extensive tuberculosis of the testicle treated by x-ray exposures; 126 treatments lasting ten minutes each were given during ten months. Complete healing resulted, with no sign of recurrence during two years following.

Infections of the Urinary Tract. Guyon² devotes a clinical lecture to a discussion of the dangers to the organism inherent in pus infections of the urinary tract; and emphasizes a warning against the performance of major operations on the kidney, bladder, or prostate when severe infections of the urinary channels exist. The latter should be removed by internal urinary sterilizers, such as urotropin, by lavage of the bladder and prostate with silver nitrate solution or other antiseptic, and by drainage through the retained catheter before such operations are undertaken.

PNEUMOCOCCUS INFECTION. Picker³ reviews the literature concerning the pneumococcus as a denizen of the genitourinary tract. It is generally pathogenic, though some cases of apparent harmlessness have been observed. He also reports a case of urethral infection with the pneumococcus, the pus discharge appearing three days after a suspicious intercourse.

STAPHYLOCOCCUS ALBUS INFECTIONS. An infection of the urethra by the white staphylococcus, identified by cultures, has recently been under my own observation. The pus discharge, never profuse, appeared within a week after exposure with a woman of apparent genital health; no gonococci were discovered in either person, nor was there a history of such infection in either.

PUS INFECTIONS OF THE URINARY TRACT SECONDARY TO SKIN LESIONS. Jordan has operated on 12 cases of renal or perirenal abscess following boils or other small peripheral foci. He remarks upon the difficulty of distinguishing infections of such obscure origin from typhoid infection, appendicitis, and liver abscess; it is probably confused with some of the latter.

Israel says that such abscesses appear consecutively to nasal catarrh.

¹ Medical Record, April 15, 1905.

² Annales des maladies des organes genitourinaires, 1904, No. 22.

³ Centralblatt f. Krankheiten d. Harn. u. Sexual Organe, 1905, p. 133.

DIFFERENTIATION BETWEEN TUBERCLE AND SMEGMA BACILLI.

Young and Churchman¹ review the various staining and culture methods that have been furnished for distinguishing the tubercle from the smegma bacilli in the urine, and reject them all as unreliable. They affirm that the only satisfactory procedure consists in the thorough removal of the smegma bacilli from the urinary channel prior to securing the specimen for examination. Since the smegma bacillus is often found in the anterior urethra, but rarely beyond the bulb, this channel should be thoroughly irrigated as far back as the bulb, after which a clean catheter may be introduced into the bladder. Bacilli found in the urine so procured, which present the known reactions of the tubercle bacillus, may be identified as the latter with confidence.

Anatomy and Physiology. Guyon² discusses the sensibility of the bladder in health and disease, emphasizing the distinction between sensibility to contact and to distention. Under chloroform anæsthesia sensibility to contact is abolished, but that to distention is reduced only a little in health and not at all in disease. Hence distention of the diseased bladder should be scrupulously avoided. By preliminary treatment, whereby cystitis is reduced, greater distention can be safely made, and less chloroform is needed.

Hogge³ presents an elaborate and exhaustive study of the anatomy, physiology, and development of the muscles of the perineum.

CLINICAL ANATOMY OF THE TRIGONUM. Whiteside⁴ and Uteau⁵ have studied the anatomy of the trigonum with reference to its clinical applications. It is often found to be remarkably narrow, a feature which makes ureter catheterism difficult and renders the various segregators wholly unreliable. This narrowness is also an argument in favor of suprapubic as against perineal prostatectomy. The relations of the trigonum are not changed by prostatic hypertrophy, but are apt to be by uterine displacements.

Sterility from the X-ray. In 1903 Albers-Schoenberg⁶ published the results of experiments on animals showing that exposure of the testicles to the x-ray for certain periods caused azoöspemia through arrest of the spermatogenic function of the testes. He exposed 5 male rabbits and 6 male guinea-pigs to the rays for total periods of 195 to 377 minutes, divided into sittings of 15 to 40 minutes each at intervals of seven to twenty-seven days. All these males were then given ample opportunity for copulation with unexposed and normal females for periods

¹ American Journal of the Medical Sciences, July, 1905.

² Annales des maladies des organes genitourinaires, 1905, No. 32.

³ Ibid., 1905, No. 14.

⁴ Portland Medical Gazette, November, 1904.

⁵ Annales des maladies des organes genitourinaires, 1905, No. 4.

⁶ Münchener med. Wochenschrift, 1903, No. 43.

of several weeks, and although these males showed the sexual desire and potency usual to their species, not a single female was fertilized.

Eight of these males were killed and their sexual organs examined; in 1 (which had received the least x -ray exposures) a few spermatozoa were discovered, while in the remaining 7 no evidence of spermatozoön formation was found. Whether this sterility was transient or permanent was not determined beyond ascertaining that 2 of the exposed males failed to impregnate females during four and one-half months after cessation of the exposures.

Bergoiné and Tribondeau¹ observed similar results from exposure of male white rats to the Roentgen rays. They also report² as the result of their histological studies of the testes so treated that the seminal epithelium encloses two kinds of cells specialized in function, one forming the spermatogons, while the second assures the nutrition of the first. It is the former cells that are destroyed by the x -ray. The testicles of the exposed animals are usually diminished in size and consistence, being sometimes only two-thirds their normal size and noticeably softened.

Halberstaedter³ found that in the ovaries of rabbits exposed to the x -rays the Graafian follicles were obliterated, replaced by homogeneous masses in which the remains of nuclei could be occasionally recognized. He thinks that the ovaries of rabbits are more sensitive to the destructive effects of the rays than are the testes.

The effects of the x -ray upon the spermatic function in the human subject were noted in two cases by Philipp.⁴ In one the testes were exposed ten to fifteen minutes daily for thirty days, a total exposure of 365 minutes; at the end of this time the semen contained as many motile spermatozoa as at the beginning. The second patient was treated by the x -ray for pruritus ani, receiving 195 minutes' exposure in twenty days. Seven months later the semen contained no spermatozoa.

Brown⁵ reports that every one of eighteen manipulators of x -ray generators for several years past, whose semen he has examined, show complete or almost complete azoöspemia. The subjects were men in robust health, ranging in age from twenty-two to forty years, and none has observed any tendency toward impotence. Half of them are married, and none of these has begotten a child since beginning x -ray work. The testes seem normal in size and consistence; the semen rather less abundant, but in all cases that have been exposed to the x -ray for considerable periods contains no spermatozoa.

¹ Comptes rendus, 1904, p. 400 *et seq.*

² Ibid., 1905, April 8.

³ Berliner klin. Wochenschrift, January 16, 1905.

⁴ Fortschritte auf dem Gebiete d. Roentgenstrahlen, 1904, Bd. viii.

⁵ American Journal of Surgery, April, 1905.

The author quotes also a case in which a man, aged twenty-nine years, after furnishing semen found to contain many active spermatozoa, received two *x*-ray exposures of ten to fifteen minutes each for pruritus ani, the scrotum being protected; the semen examined after these exposures contained many spermatozoa devoid of motion. Three weeks later two more exposures were given, after which two examinations of semen showed complete absence of spermatozoa. Five months later the semen contained large numbers of active spermatozoa. There were no appreciable changes in the testes or epididymes.

It seems apparent then that exposure to the *x*-rays of the genital organs may produce sterility in the human subject, and that these organs of all persons exposed to the rays should be protected from these emanations by leaden or other shields. Observations upon animals make it probable that the human female is quite as liable to sterility from these exposures as the male has been shown to be

DISEASES OF THE KIDNEYS.

BY JOHN ROSE BRADFORD, M.D.

Glomerular Lesions of Diffuse Nephritis. Herringham and Thursfield¹ have studied the lesions in the glomeruli in 30 cases of diffuse nephritis which were observed clinically and where the diagnosis of diffuse nephritis was arrived at from a consideration of the clinical facts as well as of the morbid anatomy. In 2 cases out of the 30 no evidence of disease of the glomeruli was found. In the others there was a great variation in the extent to which the glomeruli were involved. In some cases only a few were affected and in others hardly a single healthy glomerulus could be found. The authors do not think that there is a separate type of the disease to be recognized as glomerular nephritis, and they regard glomerular changes as an essential part of the morbid anatomy of diffuse nephritis.

This conclusion is in harmony with the experience of most authors that the division of nephritis into glomerular, tubal, and interstitial is really artificial and that really all the elements of the kidney are usually involved, although it may well be that the degree of involvement of the different renal elements is unequal in different forms of nephritis. Herringham and Thursfield consider that a number of epithelial cells collect between the parietal and visceral layer of epithelium lining the glomerular capsule. They regard these cells as epithelial owing to their size, their staining reaction, and because the cells of the parietal layer of the glomerular epithelium show signs of division.

The authors consider that in different cases of nephritis the arrangement of these proliferated cells undergoes some variation and they recognize four forms. In the first all the cells lie in a confused mass within the capsular space. In the second the inner cells show a tendency to a concentric arrangement. In the third all or nearly all the cells are arranged in layers, but only some of the cells are long and flattened out. In the fourth form all the cells are in layers and all are elongated and thin. A liquid effusion of an inflammatory character always lies around and between the cells. According to the authors lymph is present in the effusion, but it does not give the staining reaction of fibrin. The

¹ Transactions of the Pathological Society, 1904.

visceral layer of the capsule is often torn off from the tuft owing to the shrinkage produced by hardening reagents. The presence of the inflammatory effusion, together with the different manner in which the cells may be arranged, produce the appearances that have been considered to suggest that true connective tissue is being formed.

The authors consider that at first an ordinary inflammation of epithelium occurs and that the gradual transformation of the products of this inflammation occurs without any additional new factor, and they have been unable to observe any invasion of the capsule by small round cells. They consider that the pressure exercised by the blood in the capillary tuft is the agent that produces the concentric lamination and the flattening of the cells of the tuft. When the effusion first takes place no doubt the tuft is compressed, but as the inflammation subsides they think the blood pressure tends to re-expand the tuft and so compresses the capsular contents against the outer wall, and the greater the expansion of the tuft the greater the degree of lamination of the inflammatory products within the capsule.

They also consider it is probable that in all cases where effusion takes place the capillary wall sustains some damage, although this may not be recognizable. As a rule, this damage is insufficient to cause the death of the tuft and with the subsidence of the inflammation the circulation is re-established. In other instances the damage inflicted is greater and the glomerulus remains simply as a homogeneous matrix with a few cells scattered in it but with no trace of the epithelial capsule or of the capillaries. The process of degeneration is apparently gradual, since sometimes one loop alone is affected, and in other instances all the outer portions of the tuft are involved while the central portion remains unaffected. Ultimately, when the degeneration is complete the coalescence of the degenerate tuft with the inflammatory products produces a structureless mass surrounded by fibrous tissue. The degeneration of the capillary tuft has usually been looked upon as a sequel of pressure upon the tuft or as a result of arterial occlusion. Herringham and Thursfield have been unable to find any evidence in support of either of these views, and they consider that no mechanical cause will account for the degeneration but that it is dependent on the action of a chemical or bacterial poison.

Syphilitic Nephritis. Syphilis, like other infective diseases, may not only give rise to nephritis but this complication may occur at different periods after the initial infection, and, further, very different forms of nephritis may be produced. It is only comparatively recently that the importance of syphilis as an etiological factor in the production of nephritis has been recognized, and just as formerly many cases of myelitis really due to syphilis were imputed to other causes, so now syphilitic nephritis is not

always recognized as such, although really the type of the disease is often very characteristic.

The recognition of the specific character of the nephritis is of importance both from the prognostic and therapeutic point of view. It is not uncommon for the severity of the renal symptoms to lead to a grave prognosis being given, when in the course of time this is falsified by the complete subsidence of the albuminuria. Syphilitic nephritis is often characterized by the presence of a very intense albuminuria unaccompanied by some of the other features of renal disease, such as dropsy. There is probably no form of nephritis where the percentage amount of albumin in the urine is higher than in some forms of syphilitic nephritis. This intense albuminuria may persist for weeks or even for months and then subside completely. Although such a subsidence is perhaps not unknown in other forms of nephritis, it is certainly very infrequent except in syphilitic nephritis. Dropsy may or may not be present and is certainly frequently absent. The other phenomena of severe renal disease, such as uræmia and cardiovascular changes, may be present in severe cases, but cardiovascular lesions, such as dilatation of the heart and cardiac hypertrophy and high tension, are certainly not invariably present even in cases of prolonged duration.

Nephritis may complicate syphilis at different periods after the initial infection. Thus a nephritis of varying degrees of severity is not uncommon a few weeks after infection and associated with the secondary rash. This form of the disease is generally recognized owing to the association with conspicuous syphilitic lesions, but nephritis may occur later and especially during the first two years after infection, and more especially during the first year. This is the form of the malady which is characterized by the intense albuminuria and the one where in the absence of a complete history its real nature is apt to be overlooked. In addition to these two forms of nephritis, corresponding fairly well with the similar forms seen after scarlet fever and other infective diseases, it is probable that cirrhosis of the kidney may sometimes also be of specific origin inasmuch as interstitial nephritis has been observed in cases of congenital syphilis.

Josserand¹ discusses the *treatment of syphilitic nephritis*. He also emphasizes the importance of recognizing that the nephritis occurs usually within the first year and that its onset is insidious with lassitude, headache, and possibly slight œdema; that the albuminuria is remarkable from its abundance and that over a hundred grams may be passed in the twenty-four hours. In cases where the nature of the disease is not recognized, and hence suitable treatment withheld, death may occur

¹ Lyon médical, November, 1904.

from uræmia. The specific nature of this renal lesion admits of no doubt, although some authors have suggested that the nephritis is not really of syphilitic origin but is dependent on mercurial poisoning. This, however, is completely disproved by the fact that such nephritis may arise in cases of syphilis that have not been treated at all. The specific character of the later renal complications, such as granular kidney, is much more open to question as the etiology in such cases is very often complex. As Josserrand points out, it is most important to recognize the specific nature of the nephritis occurring during the secondary stage of syphilis, as it must be treated thoroughly either with mercury or, as Fournier has recommended, with mercury and potassium iodide.

The mercurial treatment of specific nephritis is followed by a very considerable measure of success, just as it is in cases of myelitis occurring at a similar period of the infection. At the same time it must be recognized, as Josserrand points out, that all cases of syphilitic nephritis, even when occurring during the secondary period, are not curable and that in some death occurs from uræmia, and in others the albuminuria, although greatly diminished in amount, yet persists in a slighter degree. Notwithstanding these facts the mercurial treatment of specific nephritis is certainly followed by a greater measure of success than is seen in the treatment of other forms of nephritis complicating other infective diseases. The mercurial treatment of the late or tertiary renal lesions is not followed by success, and in this respect the renal lesions present considerable resemblance to the lesions of the nervous system associated with syphilis, since it is generally recognized that whereas the mercurial treatment of myelitis or even of hemiplegia occurring during the secondary stage is very successful the similar treatment of tabes or of general paralysis is not very successful.

Although the administration of mercury is the essential factor in the treatment of specific nephritis, the other usual dietetic measures must also be employed, and it is well to restrict the diet to milk, at any rate for a few weeks at the onset of the malady. In cases where the albuminuria is not only very abundant but also persistent, and where, therefore, the loss of proteid matter to the organism is considerable, it will often be advisable to increase the diet, as such increase is very often not followed by any corresponding increase in the albuminuria. Measures should also be employed to prevent any overdistention of the vascular system, as it is not uncommon for considerable circulatory embarrassment due to cardiac dilatation to occur in this malady. Simple saline purgatives are, on the whole, the most suitable agents for this purpose.

Kidney Extracts. Although the evidence of the existence of an internal renal secretion has not been strengthened of late years, nevertheless methods of treating renal disease by kidney extracts are from time to

time brought forward. The results obtained are most contradictory, both clinically and experimentally, but it must be admitted that the difficulties in gauging results are greater in the case of the kidney than with some other glands. The impairment of the excretory function of the kidney in disease of this organ will necessarily prevent results being obtained at all analogous with those seen in the case of the thyroid body, even if the existence of an internal renal secretion were established. Such results as have been obtained with the use of renal extracts have usually been the mitigation of uræmic symptoms, and inasmuch as the course of uræmia is most uncertain, this among other reasons has led to a good deal of skepticism as to the efficiency of renal extracts. Further, the work in recent years on cytotoxins has established at any rate that renal extracts are also capable of producing toxic effects on the kidney and other organs, and many observers have asserted that the use of renal extracts after double nephrectomy in animals tends rather to hasten death than to prolong life.

Arnozan¹ has summed up the knowledge to that date (1903) as to the action of renal extracts, and he states that hitherto, although some of the symptoms of uræmia may from time to time have been relieved, there is no instance known either of the cure of chronic Bright's disease or of the disappearance of albuminuria following the administration of raw kidneys or of glycerin extracts, and, further, that there is a considerable amount of evidence to show that these extracts may be definitely toxic and exert a special toxic action on the kidneys. Although this conclusion will probably be in accord with the views of most authorities on the subject, very different results have been claimed by Renault.²

Renaut and his pupil Choupin³ claim that by the use of a different method very striking results may be obtained in the treatment of chronic renal disease by kidney extracts. These authors are not in favor of the use of the actual kidney substance or of glycerin extracts. The former they point out is not well tolerated if given raw and may be distinctly toxic, and they consider that glycerin extracts may undergo very considerable changes in the course of preparation, and, further, that the glycerin extracts usually contain only a very small quantity of the supposed active constituent. Renault advocated the use of a watery extract of the fresh kidney prepared by maceration of the organ, and his usual method is to take usually two kidneys of the pig absolutely fresh. The capsule is removed and the organ minced and subsequently washed in distilled water to remove the urine. In some instances he has used only the cortex of the organ, as he considers that the active principle

¹ *Gazette des sciences médicales*, Bordeaux, 1903.

² *Académie de médecine*, 1903.

³ *Revue de médecine*, 1905.

of the internal secretion is only found here. According to Renault it is essential to use the kidney of an omnivorous animal like the pig rather than that of an herbivorous animal. The minced kidney is then pulped in a mortar with 450 c.c. of a 0.7 per cent. solution of sodium chloride. The mixture is allowed to stand surrounded by ice for four hours and is then decanted. The extract, which according to Renault has no unpleasant taste, is flavored with a little luke-warm soup and is then administered to the patient.

Renault and Choupin give the maceration daily for ten consecutive days and then it should be omitted for four or five days. If this is not done unpleasant symptoms, such as papular eruptions, nausea, and vomiting may occur. But if administered according to these directions with periods of intermission, they state that it is well borne. Syrup of lemons may be mixed with it to make the preparation more agreeable. The authors state that two kidneys a day should be given for the ten days, and that it is essential that the maceration only should be employed and that none of the pulp of the minced kidney should be given.

Choupin records the general results hitherto obtained by the use of renal extracts and mentions the cases recorded by some eleven writers, in all of which some improvement followed the use of renal extracts. The renal lesions present were varied; in some there was eclampsia, in others suppurative nephritis, and in others chronic nephritis.

Choupin also records in detail 2 cases of his own which were treated with the extract prepared by maceration according to Renault's method. The first case was one of renal disease secondary to cardiac dilatation, where dyspnoea and oedema with a scanty excretion of urine, together with considerable albuminuria, were present. The use of the fresh extract was followed by a great increase in the quantity of urine and a corresponding diminution in the albuminuria and dropsy. The renal extract was used in the treatment of this case with periods of intermission for between three and four months and the final report of the case showed that very distinct improvement had apparently been produced. The success of the treatment was all the more marked, inasmuch as the patient had failed to respond to the ordinary routine treatment commonly prescribed for such cases. Further, the patient's health has remained satisfactory notwithstanding the cessation of the treatment. The second case treated by Choupin was one of interstitial nephritis with generalized dropsy, cardiac hypertrophy, and enlarged liver. Further, the patient had very marked uræmic symptoms and was an unfavorable subject owing to alcoholic habits. In this patient other forms of renal extract had been employed, more especially a bouillon prepared from kidneys which had failed to produce any beneficial effect. Treatment

with the extract prepared by maceration was here also followed by a notable increase in the quantity of urine and a diminution of the œdema and of the uræmic symptoms. The extract, both in this patient and in others, caused copious perspirations of a urinous odor. The improvement produced by the treatment was such that the patient, who was apparently moribund when it was started, was able to get up and go out and attend to his business. The improvement was maintained for over three months, but subsequently to this a return of uræmic symptoms occurred and the patient ultimately died. The author states that the toleration of the extract was perfect, that no eruptions were produced but that copious perspiration with a urinous odor were produced at first. A marked diuretic effect was also produced and, thanks to this, the œdema disappeared and all uræmic symptoms cleared up. He considers that the success of the treatment was such that the patient was led to believe that he was quite well and thus was guilty of various imprudences which ultimately led to his death. Choupin further considers that this case proves the inefficiency of renal extracts which have been heated and prepared by other methods.

If would seem from these results that an extract prepared from the kidneys according to Renaut's method is at any rate capable of relieving the dropsy and some of the symptoms of uræmia, but many more observations will be required before there is sufficient evidence in favor of the use of such treatment, especially when we bear in mind, as already mentioned, the evidence as to the toxic action of extracts prepared from the organs of one animal and then injected into the circulation of another. It is, of course, possible that the administration of the extract by the stomach may prevent the manifestation of such toxic actions, and it is well known that the thyroid extract at any rate produces all its beneficial results when administered by the mouth.

Dechloridation in Renal Disease. There is at the present time a considerable difference of opinion with reference to the value in the treatment of renal disease, and especially of nephritis, of withholding chlorides in the diet. Some authors consider that in certain stages of nephritis the kidney is not only unable to excrete the full amount of chlorides, but that this is a measure of the physiological activity of the renal epithelium, and that by observations on the elimination of the chlorides valuable information can be obtained as to the efficiency of the renal filter. The retention of chlorides has other effects which are even of greater importance, according to these writers, inasmuch as the retention of chlorides is commonly synchronous with an increase in dropsy. There can be little doubt that there is an inverse relationship between the excretion of chlorides in the urine and the development of dropsy.

Dickinson pointed out many years ago that the œdema fluid of renal

disease was rich in saline ingredients, and thus it can be readily understood that the excretion of chlorides in the urine must necessarily undergo a diminution at a time when dropsy is increasing. Modern writers have, however, looked upon the diminution of the chlorides in the urine not only as associated with the retention of these substances in the body, but as the cause of the retention. This view is based mainly on the fact that the administration of increased quantities of common salt in the diet is not followed by any adequate excretion of chloride in the urine. Further, the administration of food, rich in salt, has apparently been followed by increase in the amount of dropsical effusion, and this has been especially marked in cases of renal disease, but has also been observed in effusions due to other causes, as, for instance, cardiac oedema and ascitic collections. Finally, the restriction or diminution in the amount of common salt in food is reputed in many instances to have been followed by a rapid subsidence in the dropsical effusions.

Javal¹ considers the indications for this treatment in Bright's disease. Retention of chlorides in cases of Bright's disease is by no means constant, and even in the same case there may be considerable fluctuations in the degree of the impermeability of the kidney for chlorides from time to time. In some patients this impermeability is very considerable but temporary in duration, in others it is slighter in amount but may last for months. Javal points out that in ordinary practice it is impossible to make daily quantitative examinations of the urine for chlorides, and he seems to be of the opinion that daily weighing of the patient is sufficient.

Patients with Bright's disease suffering from dropsy undergo great fluctuations in their body weight, and these variations are frequently so large as to be obviously dependent on the increase or diminution in the amount of dropsy. Inasmuch as Javal, in common with some others, looks upon the dropsy as directly dependent on the chloride retention, and the chloride retention as due to the renal impermeability for chlorides, it follows according to this view that variations in the body weight may afford a very rough criterion or measure of the degree of chloride retention present.

Javal records a case carefully observed where observations were made on a patient suffering from chronic Bright's disease with anasarca and where the amount of chlorides in the food and in the urine were directly estimated and the variations in the dropsy noted. This patient on an ordinary diet, and taking about 15 gm. (225 gr.) of sodium chloride per diem, excreted some 7.3 gm. (110 gr.), and during this

¹ International Clinics, 1905, vol. iv.

period the oedema increased. The administration of a diuretic such as theobromine increased the excretion of chlorides but did not lead to any diminution in the dropsy, on the contrary this still increased. The administration of medicines was then stopped and a diet administered containing as little salt as possible. This diet consisted of 300 gm. of bread, beef, and potatoes, the bread and potatoes containing no salt. The amount of salt in the food in twenty-four hours was estimated to be 1.5 gm. (22 gr.). The amount passed in the urine was some 10 gm. (150 gr.) per diem. On this treatment in four days the oedema had remarkably diminished, and when in addition to this diet theobromine was also administered, the excretion of chlorides was still further increased and the dropsy became rapidly less. The improvement was maintained and observations subsequently made showed no evidence of chloride retention and the patient was able to take an ordinary diet and remained in good health without any anasarca three months after the onset of the dropsy.

In a second case recorded by Javal the diminished chloride excretion was very much more persistent, and here the dropsy also persisted. These cases show clearly the inverse relationship existing between dropsy and the amount of chlorides in the urine, the diminution in the chloride, being accompanied by an increase in the dropsy, and *vice versa*. We need not perhaps accept the view that the chloride retention is actually the cause of the dropsy. Still, it would certainly seem that a chloride-free diet in some cases has very marked effects in relieving the dropsy, and Javal points out that patients may be seen where the dropsy increases with a milk diet and diminishes when a diet of bread, meat, and potatoes, specially prepared and free from salt, is given.

Diuretics such as theobromine would seem to be of most use when associated with a chloride-free diet, and to be of comparatively little use when given with an ordinary salt diet. As Javal says, theobromine is able to increase the effect of the diet, but it cannot replace it. According to this author patients with Bright's disease with anasarca should be put on a chloride-free diet and very often all medication can then be avoided. Observations on the variations in the weight of the patient should be made and the diet adjusted according to the effects produced on the dropsy. Inasmuch as the dropsical fluid contains some 5 to 6 gm. (75 to 90 gr.) of sodium chloride per litre (quart) the variations in the weight of the patient will, as Javal states, give a rough measure of the chloride retention magnified between 160 and 200 times, since 5 to 6 gm. (75 to 90 gr.) of sodium chloride have to be retained in the body to lead to an increase of weight of 1 kg. (2.2 pounds) due to the presence of 1 litre (quart) of dropsical fluid. Although, as already mentioned, there may be some hesitation in accepting the view that

dropsy of renal disease is solely and directly due to the retention of chlorides, there would certainly seem to be evidence that the administration of a diet poor in chlorides is a measure of distinct value in the treatment of renal dropsy, and it is probable that more benefit may often be obtained by such a diet in some cases than by the only too common practice of ordering a rigid milk diet in all cases of renal dropsy.

According to most authors the impermeability of the kidney to sodium chloride is a more or less specific one and not directly connected with impermeability to other urinary constituents. Thus, speaking generally, the granular kidney is more impermeable to most urinary constituents than the kidney of parenchymatous nephritis.

Bernard¹ recognizes two classes of nephritis: the interstitial with the so-called impermeable kidney, and the parenchymatous with the permeable kidney. Strauss' results, however, show that the cases of interstitial nephritis are really especially characterized by the retention of urea owing to its deficient elimination, and that in parenchymatous nephritis it is especially chloride of sodium that is retained. Claude has gone farther than this and has insisted on the fact that where there is a deficient elimination of sodium chloride the prognosis is especially grave.

Achard and Loeper² consider that retention of chlorides is seen especially in acute and subacute nephritis, that it is not present in granular kidney and in some other forms of chronic nephritis, but that it is almost always present in uræmia. This question of the retention of chlorides is of especial interest with reference to the pathology of dropsy. The older views that the dropsy of Bright's disease was dependent on mere suppression of urine or on a condition of hydræmic plethora have now been largely given up and the dropsy of renal disease is more and more correlated with the phenomena of osmosis.

The dropsy was first thought to be due to the diminution in the molecular concentration of the blood, and as a result of this the transference of fluid from the bloodvessels to the tissues. It is difficult on this theory to account for the increase of weight of patients who are becoming dropsical. Achard and others have attributed the œdema to the retention in the organism of substances which normally are excreted in the urine. These substances diffuse from the vessels into the tissues, and as a result there is an increased molecular concentration of the blood and tissue juices. In order for life to be maintained it is necessary that the normal equilibrium should be restored by dilution of the blood and tissue juices, and hence the water introduced into the organism is retained to dilute the blood and tissue juice. This theory affords a

¹ *Archiv. général de médecine*, 1903.

² *Société médicale des hôpitaux*, 1903.

ready explanation of the hydræmia, the dropsy, and the scanty secretion of urine.

More recently the observations of Laufer¹ have shown that in cases of Bright's disease the occurrence of anasarca is preceded by the retention of chlorides, and further that the mass of the blood undergoes an increase which shows itself by a heightening of the general arterial pressure. This increased arterial pressure has been observed by many of the older writers and was especially insisted on by Mahomed. According to Laufer the heightened blood pressure may be observed before the occurrence of the dropsy and also just before the time of the absorption of the dropsy, but it is not present when the dropsy appears or when polyuria is present. In parenchymatous nephritis the principal urinary salt retained is undoubtedly chloride of sodium, and inasmuch as the osmotic coefficient of this salt is greater than that of all the other urinary salts its retention leads to greater accumulation of water, and this is possibly the explanation of the fact that dropsy is more marked in parenchymatous than in interstitial nephritis.

Widal and Lemierre² have adduced some further evidence of the part played by sodium chloride in the production of renal dropsy. They have shown that if patients with parenchymatous nephritis take 10 gm. (150 gr.) of sodium chloride daily for a few days dropsy will supervene and the weight of the patient will undergo a steady increase owing to this retention of water. Further, that two stages may be recognized, the first marked by a mere increase in weight and the second by the actual appearance of œdema. If the administration of the salt is stopped a fall of weight occurs and the œdema diminishes or disappears. This administration of sodium chloride is never followed by the occurrence of œdema in cases of interstitial nephritis, and sometimes it fails even in parenchymatous nephritis. According to Widal and Lemierre the uncertainty in the result is entirely dependent on the rate of elimination of the chlorides by the kidneys. If these are freely eliminated no œdema occurs. On the other hand, if they are retained owing to deficient elimination the œdema is marked.

In addition to the above facts Courmont³ has shown that the administration of sodium chloride to patients with renal disease when anasarca is present is by no means free from risk, not only may the dropsy be increased but this author is of opinion that uræmic symptoms may also be produced. If sodium chloride plays such an important part in the production of the dropsy of renal disease great care must be taken in the administration of this salt to these patients. The injurious

¹ Société de biologie, 1904.

² Société médicale des hôpitaux.

³ Lyon médical, 1903.

effects of a meat diet in certain forms of renal disease have been attributed to very different causes; some have thought that the increased urea excretion was the harmful element, others that on a meat diet various toxic substances might be formed, but Widal and his pupils think the principal danger of a meat diet is the considerable quantity of chloride of sodium that is so often taken in association with a meat diet, and he advises that before any case of Bright's disease is dieted observations should be made on the elimination of chlorides, and further that in all patients with dropsy an albuminous diet free from salt should be given and that not uncommonly such a diet may produce better results than a pure milk diet. In cases where the dropsy is considerable or increasing this author recommends that water only should be given for one or two days and that in this way better results are obtained than by the administration of milk.

Tuberculosis of the Kidney. Jousset,¹ in writing on this subject, states that the progress of investigation has in recent years led to the conclusion that tuberculous infection of the kidney generally takes place through the bloodvessels. The old theory that tuberculous disease of the kidney was generally an ascending infection of the ureter or of the lymphatics does not now receive the support it formerly did. The presence of the bacillus of tubercle in the urine after the inoculation of this organism in the blood stream experimentally shows the close relationship existing between the urine and the general circulation. Jousset considers that a bacillary infection of the renal filter may take place with one or other of three different results. The bacillary infection may lead to the development (1) of specific lesions, (2) other lesions of a non-specific character may result, or (3) no lesions may be present.

1. **BACILLARY INFECTION OF THE KIDNEY WITH THE DEVELOPMENT OF SPECIFIC LESIONS.** Although formerly difficulties were experienced in producing tuberculous lesions of the kidney as a result of the inoculation with the tubercle bacillus, these difficulties have disappeared with modern methods. The inoculation if performed into an artery usually leads to the development of renal tuberculosis, but this more certainly results if the kidney at the same time is injured or irritated by some toxic substance. The tuberculous deposits follow the line of the arterioles and very frequently they are limited to the cortical region. Formerly renal tuberculosis was looked upon as due to an ascending infection owing to the frequent occurrence of unilateral lesions or to the fact that the lesion involves the medullary substance of the kidney. Neither of these facts is really an objection to the view that the infection is usually a blood one. The deposit in the medulla of the kidney is

¹ *Archiv. de médecine expérimentale*, September, 1904.

really dependent on a secondary lymphatic affection from a primary focus in the cortex. The unilateral character of the lesion is not a real objection to arterial infection. If all tuberculous infection reaches the kidney through the arterial system it would follow that primary tuberculous disease of the kidney does not really exist and the cases apparently primary are really those in which the primary focus has been overlooked.

Jousset recognizes two forms of obvious renal tuberculosis, the nodular massive form and a second or miliary form. The nodular massive form is the one which used to be regarded as a result of an ascending infection. Jousset considers that it might be advisable to retain the term "primitive" for this form of the infection on the understanding that this term is simply used in a clinical sense and that really all renal tuberculosis is a descending hæmatogenous and secondary infection. This nodular form of tuberculosis usually leads to the production of pyelitis and produces the clinical picture that is well known as associated with tuberculous kidney. This form of the disease is, on the whole, rather uncommon.

The second form of renal tuberculosis where more or less numerous granulations are scattered through the organ is a disease that does not, as a rule, produce any symptoms and hence commonly is only discovered in the postmortem room. This form of the malady is seen under two conditions: first, as part of the general miliary tuberculosis, and secondly, toward the termination of pulmonary phthisis. The older statistics did not associate the presence of tubercles in the kidney with phthisis in a large proportion of cases, but more thorough observation in recent years have shown, according to Jousset, that in some 25 per cent. of the cases the kidneys of phthisical patients contain tuberculous granulations. Although a hard-and-fast line can be drawn between the typical cases of solitary masses of medullary tubercle on the one hand and the scattered granulations on the other, intermediary cases are seen in which both types of lesion are present.

2. BACILLARY INFECTION OF THE KIDNEY WITH NON-SPECIFIC LESIONS. The kidneys of phthisical patients not only often present the lesions of a definite tuberculous character but very often present other lesions of a non-specific nature which are, however, definitely related to the pulmonary tuberculous disease. Various forms of nephritis are seen associated with phthisis and, although both tubular and interstitial nephritis may occur, Jousset considers that the most common type is a mixed one involving both the epithelial and interstitial tissue. In addition to this very definite and serious lesion other effects, such as congestion, hemorrhage, leukocytic infiltration, all essentially transitory lesions, are also found. Finally amyloid degeneration is also well

known to occur. Simple congestion with petechial hemorrhages is very often associated with phthisis. The leukocytic infiltration is a lesion of some interest, as sometimes it is the mode of origin of an interstitial nephritis and in other instances it would seem to be a definite tuberculous reaction.

The renal lesions associated with phthisis are so numerous and varied that different writers have attributed very different causes to their production, and have also regarded different renal lesions as the ones most commonly associated with the tuberculous disease of the lungs. A large number of authors, among them Johnson, looked upon chronic tubal nephritis as the most common lesion. This form of nephritis was characterized by the presence of well-marked and chronic lesions affecting especially the tubules. The lesions of the convoluted tubules, although necrotic, are quite different in character from mere fatty degeneration and the glomeruli are frequently intact. In this form of nephritis the lesions are essentially of a degenerative character.

Other authors have considered that fibrotic lesions of the kidney affecting mainly the interstitial substance are really more common than degenerative tubal lesions, and Bernhard¹ considers that interstitial nephritis is an extremely common lesion in cases of cured pulmonary tuberculosis. The lesion consists of a pure interstitial cirrhosis of the kidney, sometimes slight, sometimes severe, and presenting very close resemblance, if not actual identity, with the ordinary form of granular kidney seen after acute infections.

Jousset is of opinion that tuberculous nephritis is like other forms of the disease and therefore most commonly mixed, and that pure examples of either tubal or interstitial nephritis are rare and exceptional. The diversity of the lesions has led to the idea that many different causes are probably operative. Those forms where epithelial lesions are present have often attracted more attention owing to the clinical symptoms being more marked, whereas in the interstitial forms symptoms are often slight or absent. Considerable confusion has existed between the epithelial forms of nephritis on the one hand and amyloid degeneration on the other, and some writers have gone so far as to suppose that all cases of albuminuria in phthisis are associated with amyloid degeneration, but, as Jousset clearly shows, this is not the case and pure tubal lesions without any amyloid degeneration are not uncommon.

The frequent occurrence of necrotic changes in the renal cells and the well-known occurrence of this process in tuberculous lesions has led to the view that the renal lesions are produced by the action of the poison elaborated by the tubercle bacillus—*i. e.*, tuberculin—on the

¹ Deutsch. med. Woch., 1897.

renal cells. In other words, according to this theory the renal lesions would be of a toxic origin and dependent on the circulation in the blood streams of the specific poison tuberculin. Jousset considers that the growth of the bacillus is so slow that it is improbable that sufficient quantities of the toxin would be produced to have these effects. Further, that if this were the cause all patients with phthisis would suffer from renal lesions and that the cases where extensive caseation were present would be those where the renal lesions would reach their highest degree of development, whereas this is not the case. Further, it would seem that the tissues of tuberculous patients do not contain any toxic substance that presents any close resemblance to the tuberculin found in cultures. The action of tuberculin on animals tends to produce congestion and hemorrhagic lesions of the kidney rather than degenerative.

Jousset draws attention to the fact that in the cases of tuberculosis of the kidney where actual tuberculous granulations are present the cortical substance in the neighborhood of the granulations frequently presents appearances similar to those seen in the nephritis of phthisis; in other words, the so-called toxic nephritis may coexist with definite renal tuberculosis, and that it is especially well marked in the vicinity of the tubercles. For these reasons Jousset was led to the belief that the lesions might be dependent rather on the presence of the organisms themselves than on that of any toxic substance. In confirmation of this he has made some observations to determine whether the bacillus of tubercle could be found in the kidneys where nephritis was present in fatal cases of phthisis. In this search he has been successful, the inoculation method having been employed. Not only did Jousset find the bacillus of tubercle in cases where the renal lesion was associated with phthisis but also in at any rate one instance the bacillus of tubercle was found in a case of granular kidney where the body presented no signs of visceral or pulmonary tubercle. Five cases out of six examined in this way revealed the presence of the organism. In many cases of interstitial nephritis the organism has also been recovered from the kidney, and according to Jousset, a granular kidney may be found in something like 25 per cent. of cases.

Jousset finally draws attention to the fact that bacilluria—namely, the presence of the tubercle bacillus in the urine—may be found in cases of phthisis where neither tuberculosis of the kidney nor any nephritis or other renal lesion is present. It is probable in these cases that some very slight and possibly transitory lesion of the kidney is present. Bacilluria has been found in six cases out of eight where chronic phthisis was present and yet where no gross lesions of the kidney existed. It is most frequently present in acute pulmonary cases, but it may also be found in subacute and chronic cases. Bacilluria is usually accompanied

by a slight albuminuria. Jousset concludes by drawing attention to the fact that the tubercle bacillus may be regarded as giving rise, it may be, to (1) a simple bacilluria, accompanied by slight albuminuria, the latter dependent on a slight and transitory nephritis; (2) to nephritis, epithelial or interstitial or mixed, and (3) to definite tuberculosis either in the form of a single caseous mass or else to diffuse miliary tubercle.

Congenital Renal Lesions. Congenital lesions of the kidney are of considerable importance in clinical medicine owing to their diversity and to the serious character of many of them. Many instances of the more severe forms of movable kidney are of congenital origin. Similarly a large proportion of cases of hydronephrosis are dependent on anomalies of the ureter or of the renal vessels, more especially the presence of additional renal arteries. Cystic diseases of the kidney in many, if not in all cases, are of congenital origin.

Further, many tumors are also of congenital origin, and this is a point of great interest and importance in the cases of tumors arising in suprarenal rests. Absence of one kidney occurs with sufficient frequency to materially influence the prognosis and the treatment in cases of calculous suppression. It is probable that complete calculous anuria is more often associated with unilateral obstruction of the ureter in association with congenital absence of want of development of the opposite kidney than with simultaneous bilateral obstruction. The enumeration of these conditions shows what an important part is played in pathology by congenital lesions of the kidney, but in addition to these there are other conditions which may arise as a result of intrauterine conditions or disease. Uric acid infarcts are an instance of the one and congenital syphilitic nephritis an instance of the other.

It is possible that these lesions may lay the foundation of subsequent progressive disease. All the conditions just enumerated are fairly well established and recognized. Castaigne and Rathery¹ made some observations both clinical and experimental which if substantiated would considerably widen our views as to the extent and nature of congenital lesions of the kidney. In a former paper Castaigne was led to the conclusion that the children of certain parents were liable to suffer from what he called a special renal debility of such a character that albuminuria resulted from very trivial causes, and the present work was initiated with the idea of seeing whether this condition was dependent on congenital lesions. The authors record three families where the mother presented renal lesions and where the children were considered by the authors to suffer from this renal debility giving rise to albuminuria.

In the first family the mother suffered from hydronephrosis, mov-

¹ Archiv. de médecine expérimentale, January, 1905.

able kidney, followed by interstitial nephritis. The four children of this family were all frail, ill developed, but did not present any signs of true organic disease. They all four, however, had albuminuria as a result of very trivial causes, such as coryza, excess of food, or fatigue from exercise, and apparently albuminuria was invariably present when they suffered from any trivial febrile illness.

In the second family, where the mother also had a floating kidney and signs of a progressive atrophic nephritis, both children suffered from albuminuria. In one child the albuminuria appeared at the age of five, and at the present time, when he is sixteen years of age, the albuminuria recurs as an accompaniment of any febrile disorder. There were no other signs of nephritis such as cedema or cardiovascular changes. In the second child the albuminuria was of the so-called cyclical type.

In the third family, where the father died from a gouty kidney and the mother suffered from diabetes and albuminuria, three children out of five are known to suffer from albuminuria. In one, aged thirty-two years, interstitial nephritis is present; in the second, aged twenty-seven years, persistent albuminuria without any of the other signs of nephritis is present, and the third, aged twenty-five years, suffered from albuminuria as a sequel to fatigue. The condition of the remaining two children is unknown. In addition to these clinical facts, tending at any rate to show a high incidence of albuminuria in the children of mothers suffering from renal disease, the authors have also been able to make some observations bearing on the morbid anatomy of the kidneys of infants whose mothers succumbed or suffered from advanced renal disease. They have collected 4 cases of infants who only lived from a few minutes to one day and whose mothers suffered from chronic nephritis. The presence of the lesion in the mother was confirmed by postmortem examination in 3 out of the 4 cases. The kidneys of the four infants showed in all cases an overgrowth of connective tissue between the tubules. This overgrowth was especially marked in some zones, and here the vessels were thickened and the glomeruli presented the changes seen in glomerular nephritis. The authors consider that the changes were similar in character to those found in interstitial nephritis of adults.

The duration of life of the infants was so short that the lesions found must have been either of congenital origin or the result of intrauterine disease.

These facts having been observed the authors made a series of experiments to ascertain whether it was possible to produce lesions of the fetal kidney by experimental methods. The authors quote Charrin and Delamare, who state that the crushing of one kidney in pregnant rabbits is followed by the development of zones of congestion and of hemorrhages, together with epithelial changes in the kidneys of the

fetus. The authors have used in their experiments an injection of a nephrotoxic serum or else the injection of a renal emulsion, and they state that as a result the fetuses are not only ill developed but that in addition endarteritis, periarteritis, and a slight overgrowth of the connective tissue of the kidney are produced. In addition to these lesions degeneration of the epithelium of the convoluted tubules is also produced. The authors state also that the fetuses of animals that have received injections of toxic renal substances long before also present renal lesions. They consider that the experimental production of renal lesions in the mother is followed by the development of renal lesions in the fetuses, and that the morbid changes found in the kidneys of infants whose mothers had nephritis are similar to those seen as a result of the experimental production of similar lesions in pregnant animals.

Castaigne and Rathery think the fetal lesions of the kidney are produced in the human subject and experimentally as a result of the presence of nephrotoxins in the maternal circulation and their passage through the placenta into the fetus. This view receives some support, as the amniotic fluid of the animals experimented on is nephrotoxic. They conclude by stating that in the human subject a congenital albuminuria or an albuminuria of congenital origin may be seen in the children of parents suffering from nephritis and that sometimes it is probable that renal lesions of a serious character may have this origin.

Movable Kidney. Tuffier,¹ in a clinical lecture on movable kidney, states that according to his experience movable kidney occurs in some 20 per cent. of women. He uses as a test of the presence of movable kidney the fact that the lower border of the organ can be felt on palpation. This perhaps is rather a questionable test, as it would include a very large number of cases where the displacement was very slight and unaccompanied by symptoms. Tuffier considers that movable kidney is not a pathological entity but is part and parcel of some other morbid condition in which it may be either an accessory symptom or else the leading one.

Where movable kidney is really the leading symptom this usually arises from one of two causes, either on account of the pain that is associated with the condition or else owing to some complication such as hydronephrosis. In the great majority of the cases movable kidney is only part of a general enteroptosis, and according to Tuffier this condition is associated with a physiological inefficiency of the tissues. Tuffier divides cases of movable kidney into two groups—the simple and the hydronephrotic. In the one the kidney is simply unduly mobile, and in the other in addition there is hydronephrosis.

¹ Presse médicale, November, 1904.

The distinction between the two varieties of movable kidney is one that also influences the treatment and prognosis, as, according to Tuffier, the results of fixation where hydronephrosis is present are by no means so good as in the cases of simple uncomplicated movable kidney. The fixation of the kidney may and frequently does relieve the attacks of pain associated with intermittent hydronephrosis, and the gastric and intestinal symptoms so often accompanying movable kidney may also be relieved; but, according to Tuffier, a kidney that has been at all profoundly altered by the distention, a result of the hydronephrosis, never recovers its integrity and such an organ never performs its functions normally.

All authors are agreed that in the great majority of cases of movable kidney marked neurasthenic symptoms of a varying degree of severity are usually present, and even if they are not definitely neurasthenic they at any rate possess a highly sensitive and impressionable nervous system. According to Tuffier, the neurasthenia is primary and precedes the renal mobility. This is a point of considerable importance, as so many authors have looked upon the neurasthenia as the sequel and result of the pain resulting from movable kidney. Tuffier states that the neurasthenia in these patients is accompanied by anaesthesia of the fauces and diminution of the field of vision, both classical symptoms of functional disturbance of the nervous system. In many of these cases if the renal pain be relieved by fixation of the kidney the patients develop some other functional disturbance.

Tuffier analyzes the pain that is associated with renal mobility and considers that several forms may be recognized. The pain may be either permanent and constant or else there may be intermittent exacerbations, or finally it may supervene in crises. The continuous pain is situated in the lumboiliac region and is thus marked off from the sacral pain that is so often the result of pelvic disease. From the lumboiliac region the pain may radiate into the right flank and the iliac fossa or into the inguinal region and down the front of the thigh, and in exceptional cases to the costal margin and even down the corresponding arm. The pain is not usually acute and is more often a discomfort, a sense of weight, or a severe aching. The pain is aggravated by movement, by walking, and even in some instances, according to Tuffier, by mere effort. This may sometimes amount to a functional palsy, and, according to Tuffier, the right arm is much more often involved than the left, and patients may be seen in whom movements of the right arm are absent.

On palpation Tuffier considers that the kidney is not generally painful, or at any rate, is not tender to mere pressure. On the other hand, pain and tenderness are frequently elicited at the moment of reduction

of the displaced organ. Pain produced at the moment of reduction is usually local but may radiate down to the groin along the course of the ureter. In many instances the onset of the pain is sudden and subsequent to some traumatism. The traumatism may act directly on the flank or sometimes indirectly, as in the case of a fall or sudden strain. Tuffier considers that there are really two varieties of traumatic cases, one in which the kidney is suddenly displaced as a result of the traumatism, the other and perhaps the more common where the organ has really been displaced for some time without causing symptoms and where the traumatism has in some way led to its becoming painful.

In most cases of movable kidney, however, the onset of the pain is gradual and the pre-existent neurasthenia is greatly aggravated by the development of the renal pain. Tuffier considers that in many patients painful symptoms referable to the intestines, more especially to the cæcum and colon, are also present and mucous colitis is so frequently present as almost to constitute an invariable accompaniment. Tuffier states that in many instances the cæcum, the ascending colon, and sigmoid flexure can be palpated and felt as irregular hard painful cylinders owing to the contraction of their muscular walls. Gastric symptoms are also often present, and most authors have thought that these were in many cases dependent on the displaced kidney dragging down the pylorus and so leading to the production of a dilated stomach. Tuffier does not consider that this is the usual manner in which the gastric symptoms are produced. He thinks they are more dependent on an atonic gastric dilatation than on any pressure or traction exercised on the pylorus by the displaced kidney, although he quite admits that fixation of the kidney will sometimes relieve and cure the gastric symptoms.

In addition to the constant pain patients with movable kidney are liable to paroxysmal attacks. Tuffier thinks two forms of these may be recognized. In the first variety shooting pains radiating from the lumbar region over the side of the chest, and rarely over the sternum, take place. These exacerbations of pain are usually of slight duration and they are not accompanied either by vomiting or distention of the abdomen, but their subsidence is marked by the passage of an abundant clear urine. This, as Tuffier remarks, is really characteristic of the subsidence of all painful states. In the second variety of paroxysmal pain these are associated with the presence of intermittent hydronephrosis. The attacks of pain under these circumstances are quite similar to those seen in renal calculus, except, of course, that no calculus is passed, and, further, that during the development of the pain a renal tumor due to the hydronephrosis is gradually formed. During the onset of the pain the quantity of urine is notably diminished and the disappearance of the

pain is often accompanied with the subsidence of the tumor and the passage of an increased quantity of urine.

Tuffier considers that the increased flow of urine is not merely due to the evacuation of the contents of the dilated pelvis of the hydronephrotic kidney, inasmuch as he has seen cases where the distention of the kidney was not sufficient to accommodate more than 20 or 30 gm. of urine, and yet where the subsidence of the attack was marked by the passage of from 500 to 800 gm. (16 to 25 oz.) of urine. In other words, he thinks the increased flow is produced by a reflex effect on the healthy organ.

The attacks of pain due to movable kidney have to be diagnosed from hepatic colic, various forms of dyspepsia, and possibly some forms of intestinal neuralgia. The variations in the size of the kidney afford a most important diagnostic aid, and the only condition producing physical signs at all resembling these is biliary colic with intermittent distention of the gall-bladder. The differential diagnosis between these two conditions has to be made on the physical signs present during the attack.

ANÆSTHETICS, FRACTURES, DISLOCATIONS, AMPUTATIONS, SURGERY OF THE EX- TREMITIES, AND ORTHOPEDICS.

BY JOSEPH C. BLOODGOOD, M.D.

SURGICAL SHOCK.

FROM my first contribution to this periodical in December, 1899, up to the present time the literature on this subject has been discussed. From a practical standpoint surgical shock is one of the most important problems in operative surgery. In the investigation of this problem the practical surgeon and the pure scientist—the physiologist—meet on common grounds. Progress in solving many of the questions yet unsettled can only be accomplished by the co-operation of the surgeon and the physiologist.

In the future training of the surgeon the department of surgical physiology must be given more and more attention. This fact was clearly demonstrated at a meeting of the Johns Hopkins Hospital Medical Society on March 20, 1905, when an evening was devoted to physiological problems. The first paper was presented by George W. Crile,¹ of Cleveland, in which he discussed many practical surgical questions, which can only be answered or investigated in the physiological laboratory. The paper was discussed by Dr. Howell, Professor of Physiology, and was followed by contributions to studies in blood pressure by Erlanger and Dawson.² On the same evening Dr. Halsted gave a preliminary report of his most interesting experimental work on the partial occlusion of the aorta.

These papers and their discussion impressed me with conclusions which were later emphasized by William Townsend Porter, Professor of Physiology at Harvard, in his most interesting address before the Clinical Society of Surgery, which met in Boston some time in April of this year. The pure physiologist, on the one hand, is not especially interested in practical surgical questions, nor does his usual environment bring him in contact with what we might call the daily vital problems confronting

¹ Johns Hopkins Hospital Bulletin, August, 1905, vol. xvi. p. 269.

² Ibid., May, 1905, vol. xvi. p. 201.

the operating surgeon; on the other hand, the pure scientist works slowly on the solution of a certain problem and is unwilling, as a rule, to make any conclusions until every detail is established beyond a question of doubt. If the problem cannot be solved he drops it and takes up another. Undoubtedly, during these investigations, the physiologist learns many physiological facts which would be of great value to the practical surgeon. Yet, with the rarest exceptions, this valuable information is lost as far as the practical surgeon is concerned. Both Drs. Porter and Howell lamented this result. The average surgeon has little or no training which will fit him to work to any advantage in the physiological laboratory, and, as he gets older, the daily work becomes too overburdening to permit him to engage in scientific investigations in the physiological laboratory. Crile, a practical surgeon, undoubtedly has done more than any one else to bring before his colleagues in surgery information on physiological problems of the greatest value to them in their daily work. It is quite true that the physiologist may criticize that Crile's work lacks perhaps the precision and the absolute accuracy which should characterize all physiological investigations, and that perhaps his conclusions are based on insufficient data. Even granting this to be partially true, Crile's work, which we have previously discussed, has proved to be of great practical value to surgeons. At the November meeting of the Clinical Society of Surgery in Cleveland, in 1904, I am quite convinced that every surgeon who witnessed Crile's demonstration in the physiological laboratory was impressed, first, with the immense import of such experimental work. Every surgeon, especially in the early part of his career, should, in the physiological laboratory with experiments on animals, familiarize himself with these physiological problems; second, every one in the audience, if not already convinced by Crile's publications, became so after his demonstration in regard to the treatment of shock and returned to their own clinics prepared to give up the usual hypodermic stimulation.

How, therefore, can we bring the surgeon and the physiologist together? It seems to me that perhaps Cushing's new scheme in teaching to medical students and postgraduates operative surgery may go a long way in filling this gap.

Cushing,¹ in his contribution on comparative surgery, outlines briefly his scheme. The so-called "dog house" which has been erected between the anatomical and physiological buildings will be completed in the fall. This building is so arranged that the courses in operative surgery on animals and all work in physiology and pathology which is done with animal experiments can be carried on under the same roof. The sur-

¹ John Hopkins Hospital Bulletin, May, 1905, vol. xvi. p. 179.

geon, physiologist, and pathologist are brought together. Students taking the course in operative surgery can at the same time be instructed in physiological problems. Any operation necessary in the investigation of a physiological or pathological problem can also be used as an instruction in operative technique and wound healing. It is unnecessary to discuss further this very important innovation in medical instruction. The idea that I wish to emphasize to the general profession is the growing importance of physiological knowledge to practical medicine and surgery. In the majority of schools instruction in physiology stops at the end of the second year, and by the time the average student graduates his knowledge in this branch is buried so far beneath the cumbrous mass of clinical facts that he seldom if ever is able to resurrect it for use in his future work. There should be instruction in the third and fourth years designed to keep fresh their physiological information and to apply it to practical clinical problems. Our colleagues in physiology should not bury themselves in the shell of scientific investigation, but should frequently come before the practical physician with the results of their work. No program of a medical society should be considered complete without a contribution on some physiological question of importance to the physician and surgeon. Physiology should be brought as closely to medicine as pathology and anatomy.

Recent Literature on Shock. In the contributions of the last year no great advance has been made in our knowledge of this subject. The papers, however, are more numerous, and there is every indication that the general profession is taking more interest in this question. Unfortunately, I overlooked in the past a very important contribution by Howell¹ on observations upon the causes of shock and the effect upon it of injections of solutions of sodium carbonate. It seems to me that Howell's experimental work confirms Crile's, although he considers that the vasomotor centre in shock is affected more by inhibition than exhaustion. This difference as to the etiology does not change the principles of treatment. Howell summarizes his conclusions as follows:

1. Shock is characterized by a long-continued, low arterial pressure (vascular shock) due to partial or complete loss of activity of the vaso-constrictor centre, and by a rapid feeble heart beat (cardiac shock) due in part, at least, to a partial or complete loss of activity of the cardio-inhibitory centre.

2. Cardiac shock may occur more or less independently of vascular shock, but vascular shock is always preceded or accompanied by cardiac

¹ Contributions to Medical Research dedicated to Victor Clarence Vaughan, Ann Arbor, 1903, p. 51.

shock. The respirations in shock are diminished in amplitude and usually in rate.

3. Shock may be produced experimentally by severe operations of various kinds, but most often by extensive operations on the brain.

4. The physiological evidence in experimental shock indicates that the condition is due fundamentally to a strong inhibition of the medullary centres (vasoconstrictor, cardioinhibitory) leading to a long-continued suspension of activity, partial or complete.

5. Injections of alkaline solutions of sodium carbonate, intravenously or into the rectum during shock, increase markedly the amplitude of the heart beat and bring about a rise of arterial pressure. When the shock is moderate (aortic tension 60 to 70 mm. Hg) the injections may restore arterial pressure to an approximately normal level. When the shock is severe (aortic tension of 20 to 40 mm. Hg) the injections may increase arterial pressure by about 100 per cent. for long intervals, and the effect when it wears off may be restored by repeating the injections. The effect of the injections is due chiefly or entirely to a direct action on the heart.

6. Stimulation of sensory nerve trunks or sensory surfaces in an animal in a condition of shock leads to a further fall of pressure, and to this extent augments the condition of shock.

7. The blood of animals in a condition of shock has no toxic action when injected into the circulation of a normal animal.

The more recent contributions by Crile¹ are in confirmation of his previous communication, which we have discussed.

J. P. Lockhart Mummery² has a very extensive contribution on the physiology and treatment of surgical shock and collapse. S. Horsley,³ of Virginia, contributes an article of similar scope. In the *Index Medicus*, vol. ii., January to December, 1904, I find quite a number of references; one which I especially recommend is by W. T. Porter,⁴ of Boston.

We have, therefore, for comparison, the contributions by the physiologists Howell and Porter and the more numerous discussions by men in the practical branch. However, all of these contributions are chiefly confirmatory of our previous knowledge.

There is a piece of experimental work by Schieffer,⁵ undertaken at the suggestion of Dr. Bier, Professor of Surgery in Bonn, which is entitled to be placed among the new contributions to the subject of shock.

¹ American Medicine, 1904, vol. vi. p. 674; Medical News, 1904, vol. lxxxiv. p. 887; American Journal of Obstetrics, New York, 1904, vol. i. pp. 106-110.

² Lancet, March 18, 25, and April 1, 1904.

³ New York and Philadelphia Medical Journal for December 24, 1904.

⁴ Proceedings of the American Physiological Society of Boston, 1903-1904, vol. xii.

⁵ Deutsche Zeitschrift f. Chirurgie, 1905, Bd. lxxvi. p. 581.

Schieffer is the military surgeon assigned to the Bonn clinic, and he performed many animal experiments in regard to the relation between shock and gunshot wounds. He demonstrated that animals, especially dogs, when shot at from thirty to forty metres with shot, fall and do not rise, that is, the immediate effect of the impaction of the shot is out of proportion to the actual injury. However, when these dogs are completely anæsthetized by Klapp's method of Bier's lumbar anæsthesia the immediate shock is either not present at all or very much reduced. That is, the lumbar anæsthesia apparently blocks the afferent sensory impulses produced by the injurious effects of the shot, and the medullary centres do not receive them. The animals, therefore, show no symptoms until the hemorrhage shows its effect. This experimental study is another confirmation of Crile's method of blocking the nerve trunks in shock, and also demonstrates that anæsthesia is distinctly indicated when manipulations are necessary in the treatment of patients if such manipulations affect the medullary centres.

The Treatment of Shock. Although the following remarks are somewhat of a repetition of what I have said in previous numbers of *PROGRESSIVE MEDICINE*, nevertheless I am quite convinced that it is not out of place each year to try again to recrystallize our ideas on the proper treatment of this condition. Ignorant as we may be from the standpoint of a pure physiologist in regard to many of the factors which produce shock and of the proper methods of its prevention or treatment, it cannot be denied that physiological investigations and practical experience have taught us much which, if properly employed, will be life-saving to our patients.

The elements of the injury or the disease which have affected the patient previous to the beginning of treatment must be borne in mind. Their injurious effects already produced we cannot diminish, but we can, from the moment of treatment, prevent to a great extent further injurious effects. We now know that anæsthesia, hemorrhage, unnecessary handling of tissue, and cold are all factors which increase shock. We also know that the usually employed stimulants are contraindicated in shock. Therefore, the first requisite in our treatment of shock is to do nothing which will aggravate the condition. In the past I am quite convinced that many of the methods of the so-called surgical treatment of shock have been harmful. The one drug distinctly indicated is morphine, which should only be given when the patient is restless or suffering from pain. Restlessness and pain undoubtedly give rise to afferent nerve impulses of a depressing effect on the medullary centres. The patient should be handled with the greatest of care, not moved at all, if possible. The elevated position with the head low should always be employed. Artificial heat should be used cautiously and not overdone. In extreme

conditions the legs and the abdomen should be bandaged. When shock has been associated with great loss of blood an intravenous saline solution is indicated if the condition is critical; that is, if an effect is desired within a few minutes; in other cases the salt solution can be given subcutaneously. Although in laboratory experiments salt infusions are somewhat disappointing in their effect, they are not harmful, and in practical experience there seems to me to be no question as to their value. Whether the addition of coffee to the usual rectal salt enemata so frequently employed is of value I am not prepared to say. In patients who are somewhat shocked after long operations with general narcosis, we observe that they recover more rapidly and have less postoperative discomforts if the amount of urine eliminated is over 1200 c.c. per diem. The continuation of subcutaneous salt infusions in critical cases and rectal salt enemata in all cases undoubtedly increase the amount of urine. Theoretically this should be associated with a more rapid elimination of the poisonous effects of the anæsthetic and perhaps the blood ferments in the wound. I have been impressed that in the cases in which coffee has been added to the rectal enemata during the first twenty-four or forty-eight hours the amount of urine is greater than when salt alone is used. Coffee undoubtedly is a diuretic; it is also a cardiac stimulant. I can find no experimental work with coffee or its alkaloid, caffeine, along the lines similar to those made with strychnine and digitalis. If the effect of coffee is similar to the other cardiac stimulants it should not be used in shock. Intravenous and subcutaneous salt infusion and salt solution enemata are methods of treatment which are not employed as frequently as they should be. All except the former are easily performed. No physician should be without his infusion apparatus; it is much more important than his hypodermic syringe or his thermometer; yet how few in general practice supply themselves with the infusion apparatus or the rectal tube and glass funnel.

In the recently injured patient it is frequently the misfortune that too much attention is given to the local injury and not enough to the general condition of the patient. There is but one factor in the local injury which demands instant attention—that is hemorrhage. In the majority of recent injuries hemorrhage, as a rule, has ceased when the patient is first seen by the surgeon or physician. In these cases there is no great hurry for operative intervention for the local injury except in cases of hemorrhage. The general condition of the patient should receive first attention, and nothing should be done to aggravate the condition of shock. Only a hypodermic of morphine is indicated. The general public should be instructed not to give injured persons alcohol.

The same criticisms can be made of our treatment of the patient

during operation. The younger and inexperienced surgeon allows his attention to be too much concentrated on the operative technique and forgets the general condition of the patient. In the majority of operative clinics and operations the operator gets all the assistance he requires and the anæsthetist is left to shift for himself. In all operations, especially those upon patients in a critical condition, the operator must bear in mind all the factors which increase shock, and attempt by his vigilant and intelligent supervision to prevent their occurrence. As a general rule as little anæsthetic as possible should be given, yet when the operator is forced to handle tissues in such a way that he knows this manipulation is producing bad effects the narcosis should be deeper, because the effect of the narcosis is less injurious than the effect of the manipulations. In certain operations on the abdomen and brain the operator and his anæsthetist should work hand-in-glove together, the depth of the narcosis increasing and diminishing as indicated by the operative manipulation. The surgeon can quickly familiarize himself with the manipulations which increase shock by reading the results of experimental work on animals in the physiological laboratory, which I have previously discussed in this periodical. It is unnecessary now for him to learn this from his own operation. During every operation, and especially if the patient is in a critical condition, no blood should be lost. With our present methods of hæmostasis, hemorrhage should be considered, with the rarest exceptions, within the absolute control of the surgeon. During the operation the elevated position, head low, should always be employed if there are any symptoms of shock, and the patient should be kept warm. Intravenous and subcutaneous infusions can always be given if indicated. It is my opinion, however, that with rare exceptions these should be postponed until the end or after the operation. Hypodermics of any cardiac stimulants are contraindicated. I have not had sufficient experience with the use of adrenalin in the salt infusion, nor is there in the literature of the last year anything to indicate that its practical value is equal to that demonstrable in experimental work. This may be due to the fact that surgeons have not used it enough. In my own experience I have not yet found the necessity for any additional drug in my treatment of shock. The methods just discussed have been so satisfactory that I have hesitated to use adrenalin, fearing the injurious effects of an overdose. There are cases, however, now and then, for which adrenalin in the salt solution is indicated, provided it will accomplish on the human subject that which it has done on the animal. In a desperate case I should not hesitate to employ it as recommended by Crile.¹

¹ PROGRESSIVE MEDICINE, December, 1903, p. 87.

With the practical use of Crile's¹ pneumatic suit I have had no experience. However, I was very much impressed with Crile's demonstration before the Clinical Society of Surgery in Cleveland, November, 1904. At that time he removed a large goitre under ether narcosis. The patient was encased in his pneumatic suit and was in an elevated position, head high. It seemed that this suit allowed an absolute control over the blood pressure and a position of the patient most convenient for the surgeon, but which would be dangerous for the patient without the pneumatic suit. When one can find no fault and has had no bad experience with one's own methods it is difficult to force one's self to try other methods, but I am inclined to think that this pneumatic suit will find a distinct place in operative surgery.

Blood Pressure. In *PROGRESSIVE MEDICINE* for December, 1904, I had nothing further to say on this subject which was introduced in 1903. Since then I have read the report of the Committee of Research of the Division of Surgery of the Harvard Medical School, by Faulkner, Stone, and Murphy,² which is also editorially considered.³ The most extensive studies on blood pressure have been published by Erlanger and Hooker.⁴ Cabot⁵ presents an interesting study of blood-pressure measurements before, during, and after the administration of strychnine and alcohol in a number of febrile diseases.

The Committee of Research from the Harvard Medical School concluded that the number of factors which may influence the curve is so great that too much reliance should not be placed upon the blood-pressure records. Cabot was unable to demonstrate that strychnine and alcohol had any influence on the blood pressure in the febrile conditions which he investigated.

The majority of recent literature on blood pressure will be found in American medical periodicals. Wainwright,⁶ of Scranton, in a most interesting series of clinical studies on blood pressure and shock in traumatic surgery, seems to me to confirm the experimental work of Crile. He relies chiefly on morphine and the mechanical treatment of shock. He places little reliance on stimulants, advises intravenous and subcutaneous infusion, and questions the value of adrenalin. This communication is one of the best that I have read, and will be of value to surgeons because it is written by a colleague who has had unusual experience in traumatic surgery.

¹ *PROGRESSIVE MEDICINE*, December, 1903, p. 87.

² *Boston Medical and Surgical Journal*, March 10, 1904.

³ *Medical News* for April 9, 1904, p. 703.

⁴ *Bulletin of the Johns Hopkins Hospital*, May, 1904, p. 179, and the *Johns Hopkins Hospital Reports*, vol. x.

⁵ *American Medicine*, July 2, 1904, p. 31.

⁶ *Medical News*, March 25, 1905.

One interested in the technique of taking blood-pressure records in clinical cases should read the article by Cook and Briggs.¹ This should be read in connection with Erlanger's² communication.

Solmann and Brown³ have investigated the effect of intravenous injection of ergot on the blood pressure, and conclude that there is no evidence to recommend its use in shock.

At the present time my own experience is not sufficient to estimate the practical value of blood-pressure records in surgical cases and during operations. I am impressed, however, that it is a very important field for further investigation.

ANÆSTHESIA.

This subject was discussed in December, 1900. During the past year the chief contributions are those on spinal anæsthesia. Bier, the originator of this method, who from the beginning cautioned against its indiscriminate use, now publishes his modification, which he considers a sufficient improvement over the old method to justify the statement that spinal anæsthesia deserves a distinct place in our methods of narcosis. The contributions from his German colleagues confirm Bier's statements, and for this reason I feel that perhaps this method has passed the stage of experimentation.

On local infiltration anæsthesia nothing new has appeared. The method is increasing in its application, due to the growing familiarity with the details of the technique. In general narcosis there is apparently a continuous change toward methods of what we previously discussed as mixed narcoses. But apparently ether is still the anæsthetic of choice.

Spinal Anæsthesia. Bier's⁴ paper and its discussion before the last German Surgical Congress in April, 1905, is a most important contribution. Bier reminds us that it is four years since his first report, and now for the first time he feels confident in stating that his method is past the experimental stage. The improvement consists in the substitution of stovain, a preparation by a French chemist, for cocaine, the addition of adrenalin or like preparations, such as suprarenin, paraneprhin, and certain perfections in the technique. The details of the technique were reported by Dönitz, one of Bier's assistants, but this report is not reviewed in the *Centralblatt f. Chirurgie*, and the original, if published, I cannot find. The last report of Bier's technique appeared in the *Münchener med. Wochenschrift*, 1904, No. 14. For this reason

¹ Johns Hopkins Hospital Reports, vol. xi., Nos. 1 and 9.

² Loc. cit.

³ Journal of the American Medical Association, July 22, 1905, vol. xlv. p. 229.

⁴ Centralblatt f. Chirurgie, 1905, vol. xxxii., supplement, p. 7; Archiv f. klin. Chir., 1905, vol. lxxvii. p. 198.

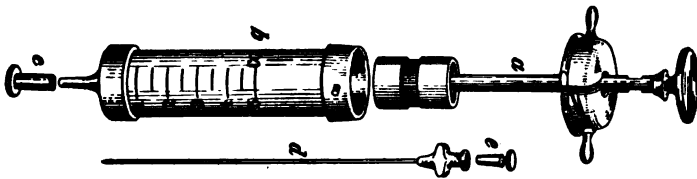
I shall leave the detailed discussion as to the technique until next year, when the latest methods can be presented from Dönitz's publication. Bier advises that the adrenalin solution (the commercial 1:1000), 0.5 c.c., should be added to the solution of stovain and both injected together. The withdrawal of the spinal fluid and its mixture with the anæsthetic solution follow the same lines previously discussed with cocaine. This change of drugs has demonstrated that the patients show practically no toxic effects during the anæsthesia and suffer less from postanæsthetic discomforts. The percentage of failures has been very much reduced. There are no deaths which could be attributed to this method of narcosis; it is especially applicable to old and feeble people, subjects whom Bier considers bad for general narcosis. Bier reports over 300 cases with 4 per cent. of failures. Some ten German surgeons entered into the discussion; the largest number of cases reported from a single clinic was 480. Some of these authorities have had equally good results with tropacocaine and eucaïne. Sonnenburg's experience is chiefly with stovain, similar to Bier. Sonnenburg was the first to report on the use of stovain. The majority of these surgeons advocate the combination with some adrenal preparation. Peonaru-Caplescu, from the Bucharest clinic of Joannescu,¹ reports 46 cases of spinal anæsthesia with stovain. The amounts used varied from 0.03 to 0.07 cg.; there is no mention in the review of the addition of adrenalin; the results seem to be as satisfactory as Bier's report. Fuster² reports on 235 cases from v. Hacker's clinic in Graz. He uses tropacocaine without adrenalin. As far as I can make out his results are as good as Bier's; he mentions 4.7 per cent. failures. His technique is as follows: "The preparation of the patient proceeds in the same way as for any other operative intervention, thorough disinfection of the field of operation after the patient has been placed on his left side, trunk elevated, head lowered forward, lower extremities drawn to abdomen, giving the greatest possible anterior curve of the spine and separation of the vertebral arches in order to facilitate entrance to the dural sac and produce increased pressure within it. Now, from the side of the patient nearest the table (to facilitate the reflux of cerebrospinal liquor) the spinous processes of the second and third lumbar vertebræ are located. This is comparatively easy when one bears in mind that a horizontal line between the two cristæ ilei strikes the apex of the spine of the fourth lumbar vertebra; the distance between the two spinous processes is divided into three parts, and, after the place of puncture has been infiltrated with Schleich's solution, the needle is pushed in at the junction of the upper and middle third of the line about the width of a thumb from the median line at an angle of

¹ *Revista de Chir.*, 1905, No. 1; Review in *Centrbl. f. Chir.*, 1905, vol. xxxii. p. 528.

² *Beiträge zur klin. Chir.*, 1905, vol. xlv. p. 1.

60° downward, and toward the median line, which should be reached at a depth of from 5 to 6 cm. The needle is thrust forward under uniform pressure, and its entrance into the dural sac is evidenced to the finger distinctly by the fact that after overcoming the firm rigid fascia it enters more easily; besides, this movement is frequently felt by the patient as a distinct pain. Now, the mandarin (trocar) is withdrawn and the liquor which escapes, sometimes gradually drop by drop, sometimes in a continuous stream, is caught in a small glass with concave bottom containing the ready dose of 0.07 gr. tropacocaine; the quantity of the cerebrospinal fluid which should be permitted to flow into this glass is about 7 c.c.; that is, a cubic centimetre of fluid to each centigram of tropacocaine. Now, the trocar is again inserted to stop the flow of cerebrospinal fluid, with a second needle held ready for use when the mixture is stirred to aid the solution of the tropacocaine; the contents of the glass is sucked up into a Pravaz syringe holding about 10 c.c., and after the trocar has been removed and the air expelled from the Pravaz the injection is given under a slow but steady pressure. This accomplished, the needle is pulled out with a rapid motion and the place of puncture protected by an iodoform-plaster dressing. The patient is then placed in the position requisite for operation—we have never employed elevation of the pelvis—and after waiting a few minutes the last disinfection of the field of operation is begun." This contribution by Fuster is monographic in character.

FIG. 6



A second contribution of similar scope has been written by Kurzwelly from Braun's¹ clinic in Leipzig. We owe to Braun the explanation of the use of adrenalin in local anæsthesia and also the amplification of the intraneural method of local anæsthesia, both of which I have previously discussed. In this clinic cocaine is used with adrenalin. Kurzwelly claims, perhaps, better results than Bier with cocaine and adrenalin, so far as after-effects are concerned. Of course, he has not been able to compare them with the results of stovain as yet. The technique of the lumbar puncture and intraneural injection is about the same as that just described by Fuster, except it is somewhat simpler and impresses me as better. Fig. 6 illustrates the needle and syringe used. The needle *d* plugged with a

¹ Deutsche Zeitschr. f. Chir., 1905, vol. lxxviii. p. 142.

stopper *e* is introduced as previously described. Into the syringe *b* stopped by cap *c* the required amount of sterilized cocaine suprarenin tablets has previously been placed. The dose of each tablet is 0.01 cocaine and 0.0001 of suprarenin. One to two tablets are employed. These tablets are sterilized in Petri dishes, they are picked up with sterilized forceps and placed in the syringe *b*. After the needle *d* has entered the dural sac the stopper *e* is removed and cerebrospinal fluid is allowed to flow into syringe *b*; if one tablet is to be used about 2.5 c.c. of fluid is collected; if two tablets, 5 c.c. is used. After the required amount is collected stopper *e* is replaced in the needle; the piston *a* is introduced into syringe *b*, which is now turned upside down, the cap *c* taken off, and the piston *a* pushed up until all air is expelled, shaken a little until the tablets are dissolved, then the plug *e* is again removed from the needle and replaced by the syringe, and the anæsthetic solution introduced.

I am sorry not to be able to present Bier's latest technique for comparison, but the principles, as far as I can gather from this extensive reading, are about the same. No cerebrospinal fluid is lost; it is used to dissolve the anæsthetic and the vasoconstrictor adrenalin. It is rather interesting that the three chief contributors use a different anæsthetic—Bier stovain, Fuster tropacocaine, and Kurzweily cocaine—and apparently get equally good results. In the discussion of Bier's article there was an equal diversity of anæsthetics, the majority favoring stovain or tropacocaine with admixture of adrenalin. From this it is fair to conclude that the improved results of spinal anæsthesia are not so much due to the substitution of another drug for cocaine, but to improvement in the details of technique.

The next most interesting contribution on this subject is by Rudolf Klapp.¹ He experimented first with the addition of adrenalin to cocaine in local anæsthesia, and his experiments confirmed the previous work of Braun,² which I have previously discussed. It is well known that if sugar milk is injected subcutaneously it is very quickly taken up by the circulation and excreted in the urine. If adrenalin from drops 1 to 20 is added to the milk-sugar the rate of elimination is diminished in pretty direct proportion to the amount of adrenalin. Braun had demonstrated that he could give animals subcutaneously lethal doses of cocaine provided it was mixed with adrenalin. The effect of the adrenalin locally is the same as cold, or the application of an Esmarch bandage or anything that produces a local anæmia. In his second communication Klapp³ gives us an excellent experimental study on

¹ Deutsche Zeitschr. f. Chir., 1904, vol. lxxi. p. 187.

² Archiv f. klin. Chir., vol. lxxix. p. 541.

³ Ibid., 1904, vol. lxxv. p. 151.

lumbar anæsthesia, especially in regard to the effect of the addition of adrenalin. If milk-sugar is introduced intradurally it is excreted in the urine. The excretion, however, is much more rapid than when introduced subcutaneously. After a subcutaneous milk-sugar injection the sugar appears in the urine in varying amounts distributed over a few hours; when injected intradurally it is excreted in the urine usually within the first hour; that is, Klapp has confirmed what has previously been known—that absorption of drugs or toxins from the intradural fluid is much more rapid than from subcutaneous tissues. He demonstrated that when adrenalin was added to the milk-sugar the elimination of the sugar after the intradural injection was very much decreased, but the effect was by no means as rapid as in the subcutaneous experiment. That is, we cannot expect the adrenalin to have an equally inhibitory effect when added to cocaine in the intradural injection as in the subcutaneous. Nevertheless it had sufficient effect to exhibit a decided difference in the intensity of the toxic effects of the cocaine. Klapp, however, was able to absolutely prevent the toxic effects of cocaine in animals if he added gelatin to the cocaine and adrenalin. He reasons that the coagulable gelatin prevented the dissemination of the toxic cocaine in the cerebrospinal fluid and thus protected the higher centres from its toxic action. Unfortunately gelatin is not yet applicable for intradural injections in man. The necessary perfect sterilization impairs its coagulability, which is the chief factor of its value. Those interested in experiments on animals should read this contribution of Klapp. I am inclined to feel that it is the best method of anæsthesia for dogs, not only on account of its simplicity, but it is less dangerous than general narcosis. This method of Klapp may prove of great value to veterinary surgery.

General Anæsthesia. Accumulated experience and reading of the literature on this subject impress me more and more that anæsthesia is an art in every sense of the word. Specially trained anæsthetists are necessary for safety. Ebbinghaus¹ in reviewing Levi's article² calls attention to the fact that his observations during visits to English clinics have impressed him that anæsthesia is administered better there than in German clinics. He attributes this to the fact that in England anæsthesia is becoming a special branch of medicine, and the majority of operations in hospitals and in private practice are performed under narcosis administered by an expert; also teaching in medical schools on this subject is better and more systematic than in Germany. Ebbinghaus states that the majority of these expert anæsthetists use some form of an apparatus, as a rule, of their own device or a modification of some

¹ Centralbl. f. Chir., 1905, vol. xxxii. p. 730.

² Lancet, May 27, 1905.

other apparatus. The principle, however, of all these apparatuses is that the single or mixed anæsthetic is administered in exact doses, and the apparatus is simple and easily portable.

The excellent review¹ of Dumont's text-book on *General and Local Anæsthesia for Physicians and Students*,² expresses pretty clearly the consensus of our views on this subject up to the present time. A general narcotic must always be considered a toxic substance which produces a partial intoxication; that the training of students in its use is defective in the majority of medical schools. No one anæsthetic can be considered equal to all occasions. The anæsthesia must be selected for each individual case; if possible it should be administered by an expert. Ether produces a rise in the blood pressure and is contraindicated in acute lung lesions and patients with hyperarterial tension. Chloroform produces a fall in the blood pressure; it should never be given in cases of shock or in patients suffering from cardiac lesions. Ethyl chloride and bromchloride are excellent agents for a very short anæsthesia; bromethyl is preferred. This view is held by my colleague, Dr. Warfield, and his results have been excellent with this anæsthetic for short operations on the nose and throat. These anæsthetics should never be given for long narcoses. It is especially important that they should be chemically pure and used the moment the flask is opened; if any of the anæsthetic remains it should be thrown away, as it rapidly undergoes chemical changes when exposed to the air. Nitrous oxide gas is the safest of all anæsthetics; it is valuable in the introduction of narcosis, to be followed by ether or chloroform. In the hands of experts the so-called mixed narcosis is apparently generally preferred; the mixtures are nitrous oxide, oxygen, ether, and chloroform in various combinations.

As this review is written chiefly for the general practitioner, not the expert, I feel justified in recommending that in the majority of cases it is better to narcotize the patient with ether or chloroform, using with chloroform the drop method on the usual open-face mask, and the same method with ether with the open cone. I should recommend to the younger men giving anæsthesia in large clinics that they make a special study of mixed narcosis and the various apparatuses in use by experts.

Wohlgemuth,³ who is known as the originator of the oxygen-chloroform narcosis, emphasizes the importance of a most careful preliminary examination of the patient before the operation by the anæsthetist. This, I am quite sure, is frequently overlooked. In the majority of cases in large clinics the anæsthetist knows very little about the patient. This one point in Wohlgemuth's communication is one that should be

¹ Centralbl. f. Chir., 1905, vol. xxxii. p. 243.

² Wein, Urban, and Schwarzenberg, 1903, 234 pages, 116 illustrations.

³ Med. Klinik, 1905, No. 20; review in Centralbl. f. Chir., 1905, vol. xxxii. p. 718.

taken very seriously. This careful preliminary study, which would include heart compensation, blood pressure, blood count, the condition of the organs, a knowledge of the habits of the patient, the disease to be treated, is a very important one, especially in critical cases. Very stout alcoholic men take ether badly, yet some of them have lesions that contraindicate pure chloroform. This class of cases is the most difficult to narcotize. Wohlgemuth also calls attention to an important detail in anæsthesia which I have just discussed under shock; that the anæsthetist must be prepared and trained to keep the patient under partial or deep narcosis, as indicated by the nature of the operative manipulations.

ETHER NARCOSIS. Alice Magaw,¹ in her report on 11,000 general narcoses without a death, recommends the ether-drop method on the open mask. Those of us who favor ether are always pleased with contributions of this character. Yet it is quite possible that one who gives ether so well might have equally good results with other anæsthetics properly selected to fit the individual case. The German reviewer² was especially impressed with her remarks on the mental treatment of the patient during the beginning of the narcosis, that everything should be done with tact and gentleness to inspire their confidence, and every arrangement should be made to ensure absolute quiet and freedom from any external disturbance. These suggestions of this anæsthetist are unusually important, especially in children and nervous adults.

Eurén, of Sweden,³ similar to Magaw, reports most satisfactory experience with the ether-drop narcosis on a small, open chloroform mask. In some cases morphine is given half an hour before the narcotic. If the patient is alcoholic a few drops of chloroform are given with the ether drops, and Eurén claims that in this way he shortens or prevents the stage of excitation and the muscle spasm and cyanosis so frequently observed in ether in this class of patients. Eurén also calls attention to the fact that this method of giving ether is the safest in inexperienced hands, and that it is the proper way to produce an ether intoxication when in local infiltration anæsthesia we desire a slight general narcosis. This drop method is the one I personally prefer. In individuals, especially in men, in whom we expect some trouble because of a history of alcoholism, or a thick neck, morphine should be given before. At any time during the ether-drop narcosis it is very simple to change to a few drops of chloroform if this be indicated. In the beginning of narcosis a few drops of chloroform can be given if the patient shows excitement, or an indication that the drops of ether are not sufficient to push the

¹ New York and Philadelphia Medical Journal, November 12, 1904.

² Centralbl. f. Chir., 1905, vol. xxxii. p. 207.

³ Hygiea, vol. lxvi. ser. ii., J. iv. p. 1018; review in Centralbl. f. Chir., 1905, vol. xxxii. p. 63.

narcosis to the second stage. At any time during the narcosis rigidity of the muscles or increased mucus can, as a rule, be immediately relieved by a change to chloroform for a few drops. I am just beginning to learn and to teach my anæsthetists this method of anæsthesia, with most excellent results.

Teuner,¹ from Bohemia, advocates ether in all cases. He reports during five years 1020 narcoses. His method is similar to that of Eurén and Magaw. No fatalities were observed. There were 6 cases of pneumonia, 2 of asphyxia, and 1 of mania, and a few cases of unimportant bronchitis. What Teuner means by asphyxia must be a very critical one, or he is an expert anæsthetist. Asphyxia is the most common accident during ether narcosis, and with the ordinary anæsthetist much more frequent than 2 out of a 1000 cases. It is just this accident that brings odium on ether narcosis. The manipulations necessary for the resuscitation of the patient may occur during the most critical part of the operation. I have never seen a death due to this accident, but it is always distressing. It occurs most frequently in the hands of inexperienced anæsthetists. If the drop method which we have discussed is employed and a little chloroform given now and then when indicated this accident rarely if ever happens. Teuner's observations on the leukocytes after ether narcosis are interesting 72 per cent. showed a rise, 8 per cent. a fall, 20 per cent. no change.

Pletzer² is also an advocate of ether and the drop method of narcosis. He describes his extensive experience and demonstrates the importance of small details for successful narcosis. He advocates the preoperative disinfection of the mouth and pharynx, that the head should be low during anæsthesia, and that after operation the patient should be encouraged to make deep respirations. He seems to think that the latter prevent postoperative lung complications.

CHLOROFORM ANÆSTHESIA. I always approach the subject of this form of anæsthesia with the fear that I am a prejudiced reviewer. In my experience ether is the anæsthetic of choice, but I find that each year, in selected cases, I am using chloroform more frequently alone or in combination with ether. In cases of intestinal obstruction or peritonitis I fear ether. It is so difficult to anæsthetize these patients with ether without running the great risk of vomiting, which is a dangerous accident. If the stomach can be washed out thoroughly before the operation ether can be given. These patients, as a rule, are so ill that one hesitates to add to their distress by washing out the stomach, so that it has been my rule to place them on the table and prepare the skin of the abdomen for operation. This, of course, shortens the anæsthesia.

¹ *Centralbl. f. Chir.*, 1905, vol. xxxii. p. 612.

² *Med. Klinik*, 1905, No. 20; *Centralbl. f. Chir.*, 1905, vol. xxxii. p. 719.

They are then narcotized with the chloroform drop method, the stomach washed out, and the operation proceeded with under ether narcosis. If the patients do not take the ether well chloroform is substituted, and in some cases we change quite frequently from chloroform to ether and the reverse. So far this method has been very satisfactory. One feels that one is using very little chloroform, and at the same time the ether narcosis is devoid of those distressing accidents of asphyxia and vomiting.

However, when chloroform is employed, one is always, no matter how large his experience, in fear of a sudden cardiac collapse. Keen¹ reports two cases of chloroform collapse in which energetic massage of the heart was employed, with one recovery. I have fortunately never observed this collapse. During the last year I have had two experiences with ether which for the moment seemed critical. One was a thin, delicate man, aged sixty-five years, suffering with carcinoma of the bladder, the other a thin, weak man, aged forty years, with carcinoma of the rectum. A careful preliminary examination of both showed no evidence of other disease; one was only impressed with their lack of muscle development and tone. In both the anæsthetist was rather inexperienced, and I am inclined to feel that inadvertently he gave entirely too much ether to produce narcosis. I saw the patients as they were lifted on the operating table preparatory to the operation. The very shallow respiration and the relaxation of the jaw impressed me that they were too deeply narcotized. As I suggested to the anæsthetist to discontinue the anæsthetic the patient ceased breathing; the pulse, however, in both cases, although weak, was not rapid; there was no cyanosis, no obstruction to breathing, every muscle was absolutely relaxed; the pupils were a little dilated, and there was no conjunctival reflex. Nothing was done except artificial respiration, gentle massage to the heart, and inhalation of aromatic spirits of ammonia. Just how long it was before respiration began again I do not know—it seemed hours. In one of the patients I delayed the operation for three days; the anæsthetic was given by an expert, and there were no complications; the patient recovered. In the second patient, the younger, with carcinoma of the rectum, the operation was continued; it was the combined abdominal and sacral method, and required four hours; but during this time the patient was never again allowed to be completely narcotized. The anæsthetist must remember that the dose of anæsthetic necessary to narcotize is in a pretty fair proportion to the body weight, and he must give the young children and the thin, emaciated adults very much less anæsthetic. I believe these two cases were distinct illustrations of an overdose of ether with

¹ Therapeutic Gazette, April 15, 1904.

its effect on the respiratory centre; neither had been given morphine. The second patient also had no complications and made a complete recovery.

Chloroform Apparatus. One interested in this subject will find a full discussion with illustrations¹ which took place before the Paris Academy of Medicine. As I have had no experience, except with the drop method, I am not in the position to discuss these apparatuses and new methods in an intelligent way. It seems to me that with the drop method one can narcotize with as little chloroform as possible, and this is the chief factor in safety. On the other hand, the anæsthetist has so much to do that he should not be burdened with complicated machinery. If, however, these apparatuses simplify anæsthesia and make an overdose of the anæsthetic impossible, their value cannot be questioned.

THE EFFECT OF ANÆSTHESIA ON THE INTERNAL ORGANS. One, even at this time, always welcomes new investigations on this subject. We must bear in mind that when the patient awakes from the narcosis the dangers of its effects are by no means over. In our scheme of ideal anæsthesia we not only endeavor to ensure against death under narcosis, but against injurious after-effects. Three extensive contributions have recently appeared, one by Offergeld² and two by Müller.³ The experimental work of these two men agrees. Offergeld worked chiefly with chloroform, Müller with all anæsthetics. Both agree that any anæsthetic produces definite changes in the cells of all the internal organs. This change is chiefly a fatty degeneration, which, as a rule, regenerates. Repeated narcosis, especially within six days, is especially injurious; that is, a second narcosis before regeneration is complete from the first narcosis and is much more dangerous than two narcoses with a longer interval. Because of this finding they criticize the usual gynecological method of an examination under anæsthesia, to be followed in a day or two by the operation. The changes after chloroform are more marked than after ether, especially in the liver and kidney, but the changes in the lungs after ether are more marked than after chloroform. These pneumonic changes are definite focal areas of inflammation. Mixtures of ether with chloroform do not diminish the effect of chloroform on the kidney, nor does the dilution of ether with chloroform diminish the effect of ether on the lungs. Previously diseased organs show the pathological changes more intensely and regeneration is less complete. Admixture of oxygen to the anæsthetic apparently diminishes the injurious effects to some extent. There, however, is no known drug which will entirely prevent the toxic effect of any anæsthetic. The injurious effects

¹ Centralbl. f. Chir., 1905, vol. xxxii. p. 528.

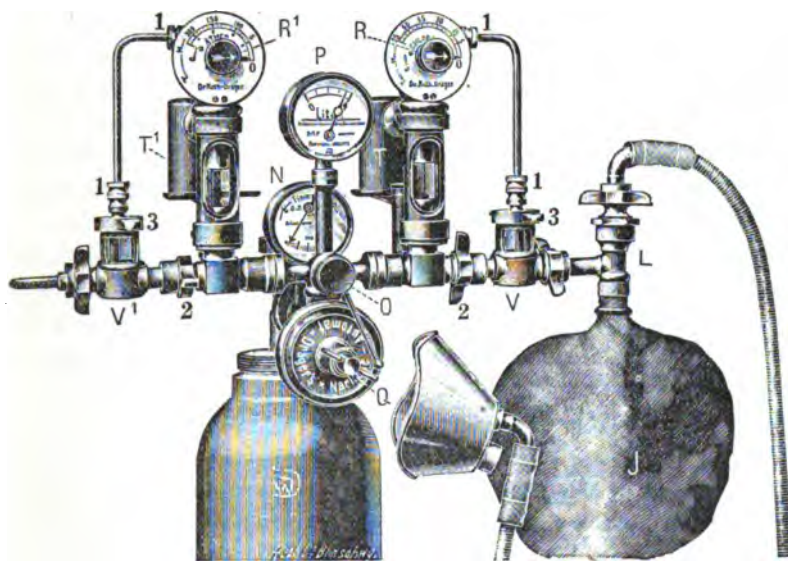
² Archiv f. klin. Chir., 1905, vol. lxxv. p. 758; Centralbl. f. Chir., 1905, xxxii. p. 346.

³ Archiv f. klin. Chir., 1905, vol. lxxv. p. 896; Ibid., 1905, vol. lxxvii. p. 420.

of bromethyl are so marked that it should never be used for a long narcosis. This work is confirmatory of previous experimental work on animals and autopsies in cases which have died after anæsthesia. It simply emphasizes the statement so often made, that anæsthetics—all of them—are toxins and must be used with the greatest caution.

MIXED NARCOSIS. The mixtures are too numerous to mention. We have previously discussed this question and stated that the accumulated experience seems to favor this method. In Müller's¹ second contribution he has studied the question clinically with extensive blood-pressure measurements and experimentally on animals, and concludes that oxygen is a very important, perhaps essential, gas to combine with every anæsthetic. The oxygen-chloroform narcosis is better than the simple chloroform; in both the blood pressure is lower, but in the oxygen-chloroform the depression is less and the fluctuations not so marked.

FIG. 7



The oxygen-ether narcosis is better than the simple ether, and better than the oxygen-chloroform. In all ether narcoses the blood pressure is, as a rule, above normal, while in all chloroform narcoses it is below normal. But Müller concludes from his investigations that a mixed oxygen-chloroform-ether narcosis, or in certain cases a mixed oxygen-ether-chloroform narcosis, is the best; that is, in those cases in which experience has demonstrated that chloroform is the anæsthetic indicated

¹ Loc. cit

we should combine the chloroform with oxygen all the time and add ether from time to time, as indicated by the blood pressure. In those cases in which ether is the anæsthetic indicated oxygen is combined with the ether, and chloroform is given at intervals in five-drop doses.

An apparatus by which this method, advocated by Müller, can be executed with ease and exactness is shown in Fig. 7, and is described in detail in the article by Kionka and Krönig, of Jena. From the illustration one can see how easily the ether or chloroform gas in exact doses can be added to the oxygen gas. The method, however, can be performed with a simple oxygen apparatus.

CONCLUSIONS. It is to be remembered, however, that even with these apparently perfect apparatuses which regulate the dose of the anæsthetic and which combine it with oxygen we are still dealing with toxic substances, and there are still dangers during the operation and possibilities of postanæsthetic fatalities or complications. Deaths have been reported with almost any anæsthetic and every apparatus. It appears to be an almost impossible task to accumulate the figures and sift the facts which will allow positive and correct conclusions as to which is the safest method. The general principles remain the same. When anæsthesia is given with great care and every detail is watched with the utmost vigilance the dangers decrease, and I am impressed that this is the first requisite of every form of anæsthesia. This fact must be impressed upon the one who is to give the anæsthetic. At the same time the surgeon should consider that anæsthesia is an integral part of the operation, the supervision of which belongs to him and for which he must be responsible. The trained anæsthetist undoubtedly will relieve him of many of the anxieties, but should not relieve him of the responsibility. For this reason the general surgeon must keep abreast with improvements in anæsthesia.

Local Anæsthesia. This subject was introduced and fully considered in *PROGRESSIVE MEDICINE* for December, 1901, when I considered in detail the infiltration, the paraneural, and intraneural methods. In the following three years nothing has been added to the principles of these methods except the introduction of adrenalin, which on account of its vasoconstrictor action localized the effect of cocaine and decreased its toxic effects. In 1903 I neglected to refer to Braun's¹ extensive communication. This communication by Braun, who, perhaps next to Schleich, has written more on this subject than anyone else, is simply an amplification on his previous work on the intraneural method. Surgeons wishing to enlarge the field of local anæsthesia will find his diagrams and plates of the greatest value in indicating to them the nerve

¹ Archiv f. klin. Chir., 1903, vol. lxxi. p. 179.

or nerves which should be injected to render anæsthetic certain areas. During the present year the only additions to local infiltration are contributions on the use of adrenalin, which are only confirmatory of what I have previously stated. In addition, stovain, which Bier¹ recommends as a substitute for cocaine, has been used naturally in local anæsthesia.

My personal experience with cocaine in solutions of 1:1000 or 1:3000 is so satisfactory that it seems to me that there is no room for improvement. Experience has demonstrated that if one understands the principles of infiltration—paraneural and intraneural injection—one can get such good results with such weak solutions of cocaine that large amounts can be used without any danger of its general toxic effect. It is remarkable how much can be done with local anæsthesia. During the last few years I have been able, even in young children, to resect ribs and drain an empyema with practically nothing but local anæsthesia. Now and then a few drops of chloroform have been given. In this operation it is important to infiltrate well about the intercostal nerve in the groove on the lower side of the rib. In very ill patients suffering with empyema of the gall-bladder cholecystotomy can easily be performed under this method of narcosis if the gall-bladder is enlarged. Other operations, too numerous to mention, are possible. In critically ill patients in whom long general narcosis is contraindicated, one should do as much of the operation as is possible under local anæsthesia. In patients suffering from shock one must recollect that certain manipulations which increase the shock should be performed under general narcosis, unless these nerve impulses can be blocked by intraneural injection possible in amputations.

ANÆSTHESIN. Lotheissen² recommends this anæsthetic powder for local anæsthetic use. Combined with lanolin and vaselin (anæsthesin 10 parts, lanolin 50 parts, vaselin 50 parts) it can be used as an anæsthetic lubricant on instruments introduced into the rectum and œsophagus, or an anæsthetic ointment in the treatment of painful ulcers and fissure in ano. I have had no experience with it.

SCOPOLAMINE-MORPHINE NARCOSIS. This method of producing a general narcosis by the hypodermic administration of the drugs, originated by Schneiderlin in 1900, was discussed in *PROGRESSIVE MEDICINE* for December, 1903, as a method still in its experimental stage. In 1904 the year's experience had added nothing worthy of comment. Up to this time this method of narcosis had been given attention in this country only in editorials and reviews. During the last year the first

¹ See articles by Coakley, *Medical News*, April 15, 1905; Cerneszi, *Centralbl. f. Chir.*, 1905, vol. xxxii. p. 284; and Peonaru-Caplescu, *Centralbl. f. Chir.*, 1905, xxxii. p. 528.

² *Wiener klin. Rundschau*, 1904, No. 44; *Centralbl. f. Chir.*, 1905, vol. xxxii. p. 719.

two papers have appeared on the experience with this method of anaesthesia in this country. Emil Ries,¹ of Chicago, reports on his personal experience of 72 cases, and Major Gabriel Seelig² on a series of 65 cases. Seelig used the scopolamine-morphine in conjunction with general anaesthesia. In these two articles one will find almost a complete bibliography.

Seelig gave each patient about one-half an hour before the general anaesthetic a hypodermic of scopolamine hydrobromate, grain 1:100 and morphine grain 1:6. The general anaesthetic used later was ethyl-chloride-ether sequence administered through the Bennett inhaler. In passing it is interesting to note that Seelig substitutes ethyl chloride for nitrous oxide because it is practically as safe, induces quicker anaesthesia, causes no cyanosis or asphyctic symptoms, and obviates the necessity of transporting bulky apparatus. I think this substitution can be criticized. My discussion of the experimental work in this number demonstrates that ethyl chloride has distinct injurious effects greater than ether on the internal organs. Why, therefore, should it be substituted for nitrous oxide which we know to be absolutely harmless? Again, why substitute ethyl chloride for ether in the beginning of narcosis, which is distinctly more dangerous, simply to save a little time? Seelig's communication, however, is one of great interest, and apparently he has had good results with the ethyl-chloride-ether sequence given with the Bennett inhaler, which required certain modifications to permit the use of ethyl chloride. Seelig claims that the preliminary scopolamine-morphine injection reduces the amount of the general anaesthetic and that the entire picture of the general narcosis is more satisfactory from beginning to end.

The dose used by Seelig, both of morphine and scopolamine, is without danger, and it seems to me that this experience in addition to that already published should induce us to try the method.

Ries has used the scopolamine-morphine for the complete narcosis, and claims that, although a number of deaths have been reported, only one can really be attributed to this narcosis, the case reported by Flatau.³ Ries collects from the literature 554 cases; he objects to the large dose of morphine recommended by Blos and follows the dosage recommended later by Korff,⁴ who gives $\frac{1}{10}$ mg. scopolamine and 25 mg. morphine, divided in three doses.

Dirk,⁵ in a meeting of the Surgical Society of Berlin, December 12, 1904, reports favorably on his experience of 260 operations under this narcosis. In the discussion Israel called attention to the irregularity

¹ *Annals of Surgery*, August, 1905, lxii. p. 193.

² *Ibid.*, p. 185.

³ *Münch. med. Wochenschrift*, 1903, No. 28.

⁴ *PROGRESSIVE MEDICINE*, December, 1903, p. 101.

⁵ *Centralbl. f. Chir.*, 1905. vol. xxxii. p. 119.

or instability of the scopolamine, even when Merck's best preparation was used.

I am still impressed with the fact that the very large dose of morphine and the instability of the action of scopolamine make this method a dangerous one. However, as a preliminary to general narcosis used in doses well within safety it can be recommended.

GENERAL ANÆSTHESIA PRODUCED BY ETHER GIVEN PER RECTUM. I witnessed this method for the first time in Boston, both in the Massachusetts General and at the City Hospitals. Demonstration was made before the Clinical Society of Surgery, which met there in April, 1905. I was impressed that it had a distinct field as the method of narcosis in thoracic surgery, especially when the Sauerbruch¹ pneumatic chamber is employed.

OPERATIVE TECHNIQUE AND WOUND TREATMENT.

In a paper read before the Wayne County Medical Society in Detroit on January 7, 1904,² on the relation of surgical pathology to surgical diagnosis, I made the statement that surgical technique is far in advance of surgical diagnosis. For some years the results of the modern technique in operations are about as uniformly good as one could reasonably desire. In the so-called clean cases, if all the details in the scheme of technique are carefully fulfilled infections are of such rarity that they can be practically excluded. In looking over recent literature I can find very little, if anything, to add to the remarks made on this subject which was introduced in *PROGRESSIVE MEDICINE* for December, 1899. Rubber gloves have become almost universal. There is only one objection to their use—the expense—but I believe this is not sufficient to be given any consideration. If there is to be economy it should be employed in other directions. Methods of sterilization of the skin differ, but the consensus of opinion favors the combination of the mechanical cleansing with soap and water and the chemical disinfection with ether, alcohol, and a solution of bichloride of mercury. In addition, it is my personal opinion that the use of permanganate of potash followed by oxalic acid is an additional safeguard. Everything that comes in contact with the wound can be made absolutely sterile by steam, dry heat, or boiling in water, to which washing soda should be added. It is quite true that boiling injures the temper and frequently dulls the edge of the knife. The problem of a sharp knife is an important one in operative surgery. If one does not need to be especially economical numerous knives kept sharp can be sterilized by boiling. This is the simpler method.

¹ *Archiv f. klin. Chir.*, 1904, vol. lxxiii. p. 796.

² *Detroit Medical Journal*, February, 1904.

Otto Grosse¹ discusses all the methods of *sterilization of knives*, and concludes that his method is the best to preserve the temper of the steel and the sharpness of the edge. Fig. 8 illustrates the closed glass tube in which the knives are placed for steam sterilization. The principles are the same as Halsted's method of sterilization of silk, which he introduced in 1889. The silk is rolled on glassed bobbins, placed into a glass tube, and stopped with cotton. If this method of Grosse really preserves the temper and sharpness of the knife it is one to be recommended. He claims that no moisture gets to the knives within this closed glass tube.

FIG. 8



There is still great difference of opinion in the selection of *suture material*, but it has been my opinion for many years that the results of buried silk are the test of the technique of the individual surgeon and the operative clinic. Before the introduction of gloves in Dr. Halsted's clinic there was a large percentage of suppurations in cases of hernia from the buried silk. Silver wire was then substituted for silk, with the distinct reduction of the percentage of suppurations. The reduction, however, was much more marked after gloves were worn by everyone connected with the operation. Now, silk is again the suture material; the percentage of perfect healings, with gloves and silk, is just as great as with gloves and silver wire. In Dr. Halsted's clinic silk is used with absolute impunity in clean cases. Infections from buried silk in these cases are unique.

The next most important point in technique is to cover the bare arm with a *sterilized sleeve* or have the gown made with sleeves. It is a just criticism to state that in too many clinics one sees too often the ungloved hand and the unprotected arm. It is a travesty upon scientific technique to observe the surgeon operate with gloves and see his assistant or nurse handle the ligature with the naked hand.

When I have operated in other hospitals with which I was not connected I have had the statement frequently made to me by the surgeons in charge that they did not dare use silk, as they always had infections or secondary stitch abscesses. Whenever this statement has been made there was no difficulty, even from a superficial observation of the technique, to understand the reason. The problems, therefore, of surgical technique in clean operations are settled. One only has to have a reasonable understanding of the principles of making a pure culture in

¹ Archiv f. klin. Chir., 1905, vol. lxxvii. p. 274.

bacteriology in which all the factors of preventing contamination are brought out. In addition to this knowledge of preventing contamination one must train one's self in such a way that during an operation these means of keeping within the bonds of asepsis becomes a second nature.

The difficulties of preventing contamination of a wound from outside infection are as slight as the difficulties of treating a wound already infected are great.

The Treatment of Infected Wounds. The problem here is a much more difficult one. Every traumatic wound not made under aseptic precautions must be considered as contaminated from sources outside the body. The principles of their treatment will be discussed under compound fractures. I should like, however, to call attention to the use of *iodine*, especially in the form of iodoformized gauze, and recommend the reading of Nicholas Senn's recent contribution in the new *Journal of Surgery, Gynecology and Obstetrics*, published for the first time in July, 1905, vol. i. p. 1. There is every experimental and clinical evidence that the iodine compounds, especially iodoform, have a distinct antiseptic value when mixed with blood or the secretions of wounds. For this reason iodoformized gauze is better for packing an open wound when this is indicated. I constantly employ iodoformized gauze as a sponge in wounds in which I fear contamination from without or within. Whenever a blood clot is left to fill the dead space it should be mixed with iodoform.

Von Mikulicz¹ and his Japanese assistant, Miyake, have interested themselves in the problem of increasing the local resistance of the tissue and the general resistance of the patients. Their clinical and experimental work seems to prove that *salt solution* increases the local resistance and preliminary hypodermic injections of *nuclein* the local and general resistance. I have had no experience with nuclein, but we use salt sponges constantly in wounds and in all abdominal work in which the lumen of the intestine or gall-bladder is opened; salt sponges are preferred to dry gauze for this reason.

I find nothing new in the literature in the use of *carbolic acid*. Apparently there is nothing more to be said on this most important therapeutic agent. I will describe its use in compound fractures later on. I would urge the general practitioner to familiarize himself with the antiseptic value of carbolic acid followed by alcohol. I have constantly referred to this in the previous numbers of *PROGRESSIVE MEDICINE*.

In the treatment of wounds after they have become lined with granula-

¹ Mittheilungen aus den Grenzgeb. der med. u. Chir., 1904, vol. xiii. p. 719, and Archiv f. klin. Chir., 1904, vol. lxxiii. p. 347.

tion tissue, *balsam of Peru* should be used in conjunction with iodoform. The recent experimental work of Schloffer¹ demonstrated that it is of equal value to the iodine preparations.

FRACTURES.

Compound Fractures. This subject I have not previously discussed except briefly in regard to primary amputations in *PROGRESSIVE MEDICINE* for December, 1899. The treatment of a compound fracture is of far greater importance as regards the life of the patient and the saving of the limb than a simple fracture. It is an accident that may occur anywhere. As the results of treatment depend so much on the immediate decision as to the proper measures, it is a surgical disease which every practitioner, especially those not in large cities near hospitals, should be prepared to meet properly as an emergency. Important as this subject is its literature is not large. For this reason I find with great satisfaction a very comprehensive discussion on this subject from the clinic of Professor Wölfler,² in Prag, by Oscar Klauber. I have read this article of seventy-nine pages with the greatest of pleasure and profit. A discussion of this contribution will allow me to bring out what may be considered the essential features in the treatment of compound fractures of the extremities.

Klauber's classification impresses me as one of the best, and I shall consider the subject under his four headings. 1. Traumatic amputations. In this group we are called upon to treat the ragged stump from which the limb has been partially or completely torn by the traumatism. 2. Cases in which a primary amputation has been done immediately because of the nature and extent of the compound fracture. 3. Volkmann's débridement. In this group the rather extensive operative procedure first advocated by Volkmann in 1877 consists not only of a thorough disinfection after a wide opening of the soft parts about the fracture, but a resection of the ends of the bone and their immediate approximation by suture, and, if indicated, a removal of extensively injured soft parts. 4. The conservative treatment. In this group the fracture is reduced just as we would reduce a simple fracture, the wound and the surrounding skin are thoroughly cleansed, in some cases the wound is closed, with or without drainage, in other cases it is left open with or without introduction of drainage. Now and then a cavity due to hemorrhage is incised; in a few cases, if the bone protrudes, it has not been disturbed until the possible danger of infection has passed.

¹ Archiv f. klin. Chir., 1905, vol. lxxvii. p. 789.

² Beiträge zur klin. Chir., 1904, vol. xliii. p. 319.

In the treatment of compound fracture we must always recollect that we have two factors to consider which are seldom present in the treatment of a simple fracture: the saving of the patient's life and the saving of the limb. We cannot in the first days give the same consideration in all cases to that perfect reduction of the fragment which is the chief consideration in a simple fracture. The first question that arises when we see a compound fracture is, Shall we amputate? If amputation is not indicated, shall we do nothing practically, that is, follow the conservative method, or is the extensive débridement of Volkmann indicated?

Historically, Klauber calls attention to the fact that in preantiseptic days the surgeon had simply a choice between primary amputation and absolutely nothing, because at that time they had no methods of wound treatment which would prevent or lessen wound infection. The mortality in those days was from 40 to 50 per cent. Billroth reports on 148 compound fractures treated before Lister's work in 1867, with a mortality of 41.1 per cent., while after the introduction of antiseptic surgery, according to Billroth and von Bruns, the mortality was reduced to 9 per cent.

After Lister's publication surgeons felt so much confidence in antiseptics that they proceeded in the treatment of this injury to do more and more from an operative standpoint, and Volkmann, in 1877, published his brilliant experience of 75 cases treated during a period of three years in which there were no deaths and only 8 (or 11.1 per cent.) secondary amputations. Other surgeons, Wagner, von Bruns and others, published almost equally good results. As the experience in preantiseptic days with this traumatic lesion had been so disastrous, and the new experience with the antiseptic method so revolutionized it, it was difficult for surgeons to estimate what part of their treatment was the essential feature. However, experience began to accumulate with less radical measures and simpler treatment, and these observations from different clinics were published and compared, and, as Klauber remarks, gradually the conclusion was forced upon surgeons that in the majority of cases of compound fracture the more radical treatment of Volkmann was not only unnecessary in many instances, but the results of this treatment, although brilliant as compared with those in preantiseptic days, were not as good as the results of the more modern simpler or so-called conservative treatment.

Klauber, however, fails at least to mention that Lister's treatment of compound fractures with pure carbolic acid is practically the so-called modern conservative treatment of to-day. If one will read in the *Lancet* for 1867 Lister's first communications on antiseptic surgery, which consisted of detailed report and discussion on his treatment of com-

pound fractures with pure carbolic acid, he will find that Lister simply disinfected the external wound and the blood cavities about the fracture communicating with the external wound with a swab of pure carbolic acid. The fracture was reduced, little or no cutting was done with the knife, and the wound was sealed with lint soaked in carbolic acid. It is in this communication that we read for the first time observations of the healing of a blood clot, and the healing of a wound beneath a scab composed of coagulated blood and pure carbolic acid.

It was the German surgeons chiefly who, protected by the antiseptic system of Lister, proceeded to do more and more operative manipulations in the treatment of compound fractures until Volkmann's method of débridement was published with his brilliant results in 1877. The reaction took place slowly and, as Klauber remarks, some of the first observations on the good results of the conservative treatment were due to the fact that the environment of the patient prevented any treatment, except simple disinfection and occlusion of the wound with antiseptic gauze. The physician or surgeon who lamented his inability to give the compound fracture more extensive treatment was agreeably surprised to find that his patient did just as well and, as a rule, better than in his experiences with the Volkmann treatment. This observation reminds one of the historical statement of the great French surgeon Ambrose Paré. In his time it was the custom for surgeons to rather extensively treat military wounds, usually pouring into the open cavity boiling oil or something equally painful, which they thought was beneficial. In a battle at which Ambrose Paré was present, the number of wounded was so great that he and his assistants were unable to treat all. The surgeons were intensely surprised to find that the wounded which had not been treated in the great majority of cases did very much better than those subjected to treatment. This observation stimulated Paré to formulate his conclusions of non-interference, which is practically the modern method of treatment of gunshot wounds. Therefore, in the early years of antiseptic surgery, as so frequently happens, the preantiseptic non-interference of Paré and the simple conservative antiseptic treatment of Lister were forgotten, and surgeons again began unnecessary interference with open wounds, not only compound fractures, but gunshot wounds.

Klauber's monograph is therefore the most recent and convincing exposition of the conservative treatment of compound fracture within its indicated field.

This knowledge is a very important and practical one for the general practitioner, because this simple treatment is possible anywhere. It is a very important knowledge which should be impressed upon the younger surgeons in large hospitals who look after the accident service.

In my experience they are apt to interfere unnecessarily with compound fractures. The stage of experimentation with this lesion has passed.

It requires experience and judgment, however, to differentiate the cases of compound fracture into those that require primary amputation, those in which an extensive operation is necessary to save the limb and those in which conservative treatment is not only sufficient but the best. Fortunately, the vast majority of cases belong to the first or last group, and for this reason one who has not had the good fortune to have this expert knowledge can rest assured that in the majority of cases his patient's chances are best if a primary amputation is not absolutely indicated to do nothing except disinfect and cover the wound with a sterile dressing.

When I became connected with Professor Halsted's clinic, in 1892, I found that the methods of treatment advocated now by Klauber from Wölfler's clinic were followed. And the experience of this clinic justifies the treatment.

KLAUBER'S TABLE OF RESULTS.

	No. of cases.	Deaths.	Secondary amputations or reamputations for sepsis.	Average days in hospital.
Traumatic amputations	24	1 pneumonia	2 cases	28
Primary amputations	14	2 delirium	.....	48
Primary débridements	15	3 = 20 % $\left\{ \begin{array}{l} 1 \text{ pneumonia} \\ 1 \text{ sepsis} \\ 1 \text{ marasmus} \end{array} \right.$	$\left. \begin{array}{l} 4 = 26.7 \% \\ 2 = 13.3 \% \text{ died} \\ 2 = 13.3 \% \text{ recov.} \end{array} \right\}$	108
Primary conservative treatment	84	$\left\{ \begin{array}{l} 5 = 5.9 \% \text{ sepsis (of} \\ \text{these 3 refused opera-} \\ \text{tion in proper time)} \end{array} \right.$	$\left. \begin{array}{l} 15 = 17.9 \% \\ 4 = 4.8 \% \text{ died.} \\ 11 = 13.1 \% \text{ recov.} \end{array} \right\}$	57

The above table graphically represents a number of cases in each group, the mortality, the wound complications and secondary amputations, and the average duration of treatment, with a total mortality of 11 (or about 8 per cent.).

TRAUMATIC AMPUTATIONS. It is rather interesting that in this clinic in 24 (or about 17 per cent.) the entire limb was practically completely, and in many instances completely, torn off, with but a single death, from pneumonia. The number of such cases, of course, varies in different localities. The traumatic amputation of the upper extremity is usually due to the arm being caught in machinery and torn off, while in the lower extremity the traumatic amputation is usually after a crush by a wheel running over the limb. In these cases the vessels are generally torn so that the inner coat immediately curls up, a thrombus forms, and the patients are saved from death from hemorrhage. In only 2 of Klauber's cases was collapse very great, and he records no death from hemorrhage. In a few cases of my own experience shock has been a marked feature,

but the patients recovered. If death takes place it is usually due to some other injury. These patients, although severely shocked, seldom die except from hemorrhage, and if this takes place death is so immediate that the patient rarely reaches the surgical clinic. For this reason we can accumulate no statistics as to the absolute mortality of this terrible traumatic amputation, but the experience of other surgeons agrees with that of Klauber, that if the injury is confined to the tearing off of a limb and the patients do not immediately die from hemorrhage, their chances of recovery are good. In Klauber's 24 cases, as a rule, an immediate amputation of the ragged stump was performed, if possible to good tissue, or an exarticulation at the nearest joint. He states that, as a rule, the stump in these patients is so benumbed from the injury that the amputation can be performed without an anæsthetic. We can see from his table that the results of this primary amputation or exarticulation have been so good that there has been but one death (of pneumonia) and only two reamputations on account of protruding bone or necrosis became necessary. This experience demonstrates that these patients will stand an operation of some magnitude without great risk.

My own experience has led me to believe that it is better to confine the operative measures to a simple removal of torn and anæmic tissue with the knife or scissors; the ligation of the large vessels, even if they are thrombosed, to prevent secondary hemorrhage (this is also recommended by Klauber). The bone, if it protrudes beyond the soft parts, can be left; later it may be possible to cover it with a plastic flap and so make a longer stump—that is, in these cases I would advise only such operative procedure which will ensure against secondary hemorrhage or sepsis from necrotic tissue. The wound can be left open and packed with gauze. After such treatment the mortality will surely be no greater, but secondary amputations for a perfect stump will be more frequent. Of course, in some cases in which the general condition of the patient does not contraindicate it the higher amputation of Klauber can be done at once. But I would hesitate to advise, unless especially indicated by the condition of the wound, an exarticulation at the hip-joint or shoulder-joint. I have not the statistics of Halsted's clinic at hand, but I do not recollect that we have ever lost a patient by this conservative treatment. Klauber speaks of another possibility in these traumatic amputations; that is, there may be a fracture in the shaft of the long pipe bone, or a dislocation above the position at which the limb has been torn off. In such cases he advises that the amputation be performed at the joint or the fracture, because the danger of secondary infections of the joint or the bone the seat of fracture is sufficiently great to justify this procedure. I have had no experience with such cases.

When we study these 24 traumatic amputations of Klauber we find that in addition to the 2 secondary amputations necessary on account of infection there were three performed to get a better stump and 7 cases which required operations on the soft parts. For this reason I think that my criticism is justified and that in the first treatment in these cases as little as possible should be done; later, when the patients have recovered from their shock and the inflammatory reaction in the open wound has ceased a proper stump, if necessary, can be made.

PRIMARY AMPUTATIONS. Klauber reports 14 cases with 2 deaths from delirium. I should judge from his contribution that primary amputation in compound fracture is only performed when the condition of the limb is such that there is absolutely no hope of saving it. This should be the rule with certain exceptions which he does not discuss, perhaps because illustrative cases did not come under his observation. In the young and robust one would hesitate much longer to perform primary amputation if there was any doubt as to saving the limb than in the old or feeble. We must recollect that in some cases, if we decide to attempt to save the limb, there is bound to be a period of infection. The better the condition of the patient the better the chances of his resistance. Klauber's experience as well as that of all others demonstrates that if an amputation must be done the quicker it is done—within a few hours—the better; that is, the mortality of primary amputation is very small as compared with that of a secondary amputation demanded later by extensive necrosis of the bone, inflammation of the soft parts, specific infections, like gas phlegmons, or gangrene.

The decision, therefore, as to primary amputation, although it rests chiefly on the local condition of the injured extremity, must also be influenced by other factors—the age and condition of the patient and the presence of other injuries. A primary amputation is a simple operation.

The decision as to its indication is sometimes most difficult. Fortunately, in the majority of cases, the decision between amputation and conservative treatment is not difficult. For this reason, as I stated before, the surgeon of limited experience will save the most lives and limbs by primary amputation in cases in which there is no doubt and conservative treatment in the others.

The two great indications for primary amputation are the injury to the blood supply of the limb and so much comminution of the bone that, even if the limb can be saved, it will be functionless.

We now, of course, are considering cases of compound fracture seen within a few hours after the injury. The longer the period of time between the receipt of the injury and the first dressing the greater the opportunities for infection, if the wound is large. This third factor—

the possibility of infection—must also be considered among the indications for primary amputation.

Experience, however, has demonstrated that a limb may be saved with good function even when there are very extensive injuries to the bone and soft parts, provided the patient receives prompt and proper treatment.

The good results of primary amputation are shown in Klauber's table. There were no cases of reamputation for sepsis, there was one reamputation to improve the condition of the stump, and three minor secondary operations on the soft parts for skin defects. These results are unusually good. It is to be noted, however, that all these amputations were performed in the surgical clinic where the environments for technique are the best. This brings up another question, whether primary amputations should be performed at once on the field of the accident, in civil or military practice, where the environment for surgical technique is the worst. It is my opinion that such amputations are contraindicated except for some special indications, which are hard to define. I believe that a majority of patients will have a better chance for recovery if the indicated amputation is postponed until they can be transported to the proper environment. I can conceive only one definite indication for such an amputation, a hemorrhage which can be controlled only by removal of the limb above the point of injury. In such cases the wound should be left open and packed. An illustration of the danger of primary amputation on the field of accident I have recorded in *PROGRESSIVE MEDICINE* for December, 1899, p. 164. This patient, a strong, healthy man, aged twenty-six years, suffered from a crush of the left leg in a railroad accident. The limb was amputated below the knee at once. He was admitted to the surgical clinic six hours after the accident; the wound had been closed; six hours after his admission to the clinic it was necessary to amputate the limb through the thigh for a gas bacillus infection of the stump; the patient recovered.

VOLKMANN'S DEBRIDEMENT. This extensive operative interference with the injured soft parts and bone undoubtedly is indicated in certain selected cases, and probably will, in such cases, save many a limb. But this operation must be distinctly indicated. We must bear in mind that it is impossible to disinfect an open wound with the same results as the unbroken skin. For this reason our so-called aseptic operations must disseminate the micro-organisms in the wound much farther beyond their original domain, and increases the chances of further infection. The theoretical correctness of this is confirmed by clinical experience, because we find that our very extensive compound fractures which were formerly treated by this débridement do just as well after the conservative treatment, and in some cases better. In addition to the danger of

disseminating the infection further separation of the periosteum, removal of loose splinters, resection of the ends of the fragments, not only increase the risks of infectious osteomyelitis, but produce conditions which retard bone union, shorten the limb, and, in some cases, result in pseudoarthroses. Klauber finds in the investigation of the cases in Wölfler's clinic from 1895 to 1903 that twelve of the fifteen operations of débridement were performed in the first three and a half years of this period, and that during the last five and a half years only three compound fractures were subjected to this treatment, and these three in the last six months. In these 3 cases this extensive treatment was substituted for primary amputation in an attempt to save the limb of doubtful cases with good results. Klauber remarks that previous to this time amputations would have been performed in these cases.

It is difficult to describe the special indications for débridement. We must bear in mind that our present experience teaches us that the danger of bone infection is less than of the soft parts, an exact reverse of the former opinion, so that in this operation attention should chiefly be confined to opening, disinfection, and packing with iodoformized gauze soft-part cavities, and to the removal of soft parts which have lost their circulation. The periosteum of the bone should not be disturbed if possible, only bone fragments which are completely detached should be removed; resection of the end of the fragments is indicated only in those cases in which they are badly crushed or in which reduction is impossible. Another very important suggestion of Klauber is worthy of repetition here. In these very serious cases in which the possibilities of secondary infection are great, not only should there be extensive iodoformized gauze packing of the soft parts, but the ends of the bone should be separated by gauze. Later, after the danger of infection has passed, or the evidence of its inflammation subsided, the bones can be united by secondary suture. This method of treatment is one not well understood in this country.

THE CONSERVATIVE TREATMENT. The principle of this is non-interference. The skin about the wound is disinfected as in other operations. Klauber confines his disinfection of the wound to salt irrigation and sponging the cavity with iodoformized gauze. In these cases now and then an incision is made to open a soft-part cavity; a completely separated fragment of bone, if exposed in the open wound, should be removed; the bone and its periosteum at the seat of fracture is not disturbed. Klauber in a few cases of oblique fracture in which one of the fragments projected through the wound left the parts undisturbed for reduction a few days later. In my experience this is pushing conservative treatment to unnecessary lengths unless the patient came under observation a number of hours after the accident in which the chances of infection

of the protruding fragments were greater than usual. It does not seem necessary to discuss his results in detail. They are unusually good. The principles of the conservative treatment have been clearly defined.

When we have decided that amputation is not indicated and have treated the compound fracture either by the conservative or the débridement method, we must remember that for some days such a patient needs vigilant attention. In these cases the hand and foot should be left partly exposed so that any change in the circulation of the limb can be observed at once. Signs of gangrene indicate immediate high amputation. Fever and leukocytosis demand that the wound be investigated at once, the packing removed, the wound irrigated. The presence of emphysema of the tissues and the characteristic bacillus in the cover-slips of the secretion of the wound also, as a rule, indicate immediate high amputation.¹ With the exception of the gas bacillus infection the longer the local and general signs of infection appear after the injury the better the chances for saving the limb. Our knowledge of wound healing teaches us that in these injuries granulation tissue is immediately produced over all torn surfaces and that this granulation tissue is nature's protection against absorption. We combat infection in these cases by freer incisions and more frequent dressings of the wound. When infection, however, takes place it requires very accurate judgment to decide whether we should amputate at once or delay in an attempt to save the limb. The dangers of delay are death from general infection. If an amputation is really necessary the longer it is postponed the greater the danger. The surgeon, therefore, finds great difficulty in the decision, between his anxiety to save the limb and that of delaying the amputation too long.

Fortunately, however, as I stated before, in the ordinary healthy individual the probabilities are that the limb can be saved by proper treatment. Vigilant observation will detect in time the specific indications for secondary amputation.

The following case will illustrate the conservative treatment of a compound fracture.

CASE. Fracture, compound, recent, tibia at junction of lower and middle third; one comminuted fragment; operation twenty-four hours after injury.—The injured man was a farmer, aged thirty-one years. Twenty-eight hours before operation a telephone pole struck the calf of his right leg and fractured the tibia in such a way that the shaft of the bone was bent with the angle of the fracture forward. The upper fragment tore through the skin and protruded, but the open wound was covered with the untorn drawers and trousers. For this reason the only possible

¹ PROGRESSIVE MEDICINE, December, 1899, p. 164.

sources of infection were the skin of the patient and his underclothing. As directly after the injury there was free hemorrhage, some organisms were probably washed away. When his physician saw him two hours after the accident the protruding bone in the wound was covered with blood clot. Nothing was done but disinfection of the wound and surrounding skin with a solution of sulphate of copper. Extension of the foot did not reduce the fragment. The wound was covered with wet antiseptic gauze and put in a splint. The patient was brought to Baltimore to the hospital. There had been no shock and his condition twenty-eight hours after the accident exhibited no local or general signs of infection. The wound was covered with an organized blood clot. The leg was shaved and the skin properly cleaned. The exposed wound was disinfected with pure carbolic acid, followed by alcohol. It was then found that the upper fragment rested upon the skin, which projected slightly beyond the lower fragment. This skin was divided for about 2 cm., which allowed immediate and perfect reduction of the fragment. The periosteum was intact over both ends and over a small fragment. The bone and this periosteum were not further disturbed. The wound was irrigated with salt solution and frequently sponged with iodoformized gauze. The ragged skin edges of the lacerated wound produced by the upper fragment were excised. Torn bits of fat and muscle aponeurosis were excised. There was a cavity between the bone and the skin to the median side of the fracture. As it was twenty-eight hours since the accident, complete closure of the wound was contraindicated. At this time, on account of swelling and hemorrhage, complete approximation was also contraindicated on account of the tension which would have been necessary. The wound was therefore but partially closed without tension. This left a line of fracture partially uncovered by skin; to cover this would have required a plastic operation on the skin. Any further skin incisions were contraindicated on account of the danger of interfering with its circulation, and as the bone retained its periosteal covering a plastic operation to cover the bone was not necessary. This is a very important fact to bear in mind in the treatment of compound fractures. When the bone is denuded of its periosteum one must cover it with skin, or if this is impossible, with muscle. On a number of occasions I have covered the denuded shaft of the fractured tibia, when there was a large skin defect, by a simple plastic operation on the muscle bundles to each side of the fracture, with good results.

The cavity mentioned above to the median side of the fracture was drained with a small piece of rubber tissue; the open wound was covered with narrow strips of rubber tissue; this manœuvre allowed free efflux to the secretions and at the same time prevented the covering of the

iodoformized gauze from becoming fixed to the granulation tissue which would rapidly form. The convalescence in this case so far has been uninterrupted.¹

I agree with Klauber in his remarks in regard to the use of plaster-of-Paris dressings in compound fractures. These cases for the first few days, until good circulation is re-established and until the danger of infection has passed, should have a simple dressing which contains plenty of sterile gauze to absorb secretions and no bandage which produces any constriction, a dressing which will allow easy access to the wound. The so-called window plaster-of-Paris cast as an early dressing is to be condemned. The absolute fixation of the fragments up to at least ten days is not necessary.

Simple Fracture. SUBPERIOSTEAL FRACTURES. The *x-ray* has demonstrated that we frequently overlook simple fractures, especially those in which in spite of the loss of continuity in the bone there is no displacement of the fragments. When this fracture occurs near a joint the clinical diagnosis of a sprain or traumatic arthritis is frequently made. If the injury is at the ankle a flat-foot may develop, at the hip a traumatic coxa vara, at the wrist a weak joint. In the shaft of a bone, on account of the local tenderness, a diagnosis of bone contusion is made, and if callus forms afterward, traumatic periostitis. In many of these fractures without displacement the so-called subperiosteal fracture, the non-recognition of the nature of the lesion is not harmful, unless on account of burdening there is a slowly forming resultant deformity which with bony union prevents correction without refracture. At the present time, therefore, we should be more insistent about an *x-ray* examination in those cases which occur after an injury from which a fracture is possible, yet in which our examination for fracture is negative. Hennig,² the marine surgeon assigned to the surgical clinic in Kiel, reports on seven subperiosteal fractures observed in this clinic during the past three years. Fig. 9 illustrates a tracing of an *x-ray*, anteroposterior view, of a child aged six years. The irregular transverse line demonstrates a supracondyloid fracture of the humerus without displacement. We note at this age an ossification of the internal condyle (*a*) which is not displaced, and of the capitellum (*b*). The absence of any shadow for the external epicondyle and trochlea demonstrates that at six years of age these centres of ossification are still cartilage. The subject of fractures of the elbow in children and the ossification of the bones forming this joint I have previously discussed in great detail.³ The capitellum which we see in this figure appears in

¹ October, 1905. The patient made a good recovery.

² Deutsche Zeitschr. f. Chir., 1904, vol. lxxv. p. 262.

³ PROGRESSIVE MEDICINE, December, 1900, p. 135.

the third year; the internal epicondyle, which is also seen, at the fifth year. The other centres ossify later. For this reason this picture is correct for the sixth year.

The patient in this case fell on his elbow; there was no deformity, no restriction of motion, nothing but slight swelling and tenderness of the humerus a little above the joint. As a rule, in children this fracture is associated with considerable dislocation of the fragments, illustrated by *x*-rays in *PROGRESSIVE MEDICINE* for December, 1900. Whether any loss of function would have resulted if the fracture illustrated in Fig. 9 had been overlooked I do not know; I am inclined to think not. Yet it is quite possible that before bony union had taken place a second

FIG. 9

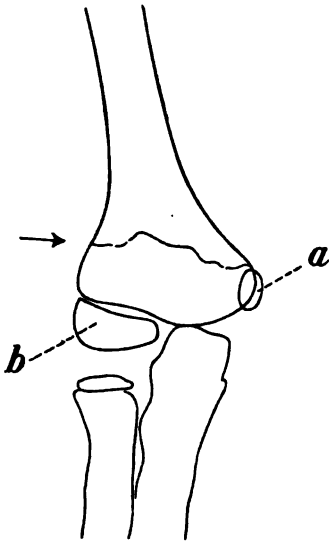
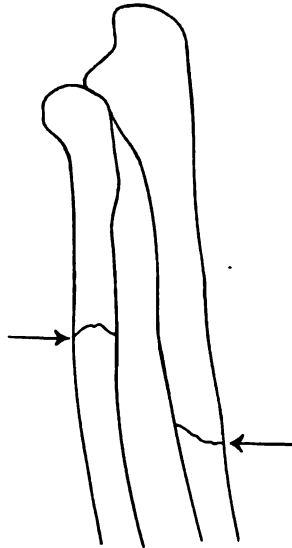


FIG. 10



slight injury would have displaced the fragment. In Fig. 10 a child of nine years fell on the dorsal surface of the left hand and was admitted to the clinic with pain in the wrist and elbow. The clinical picture of a supracondylar fracture of the humerus was sufficient to make a diagnosis, but the transverse fractures of both bones of the forearm on the same side would have been overlooked but for the *x*-ray. This combination of fractures is unique, the first I have found. Hennig does not state whether the child was rachitic or not. In this disease subperiosteal fractures, single and multiple from an indirect trauma, are not infrequent. Fig. 11 illustrates a transverse fracture of both bones of the leg without displacement. The patient, a male aged eighteen years, fell to the ground, after which a trunk which he was carrying on

his shoulder fell on the calf of his leg. At the examination there were no symptoms except local tenderness over the tibia and a slight ridge at the line of fracture. The case is of interest to me because the etiology of the fracture is the same as the one which I have just discussed in detail under compound fractures, except that in my observation the tibia was bent forward and the upper fragment pushed through the skin. After I reduced the fragments there was so little separation of the periosteum, although it was completely torn, I am inclined to think that had it been a simple fracture it would not have appeared any different clinically or in the *x*-ray after the reduction than the so-called subperiosteal fracture in Fig. 11. That is, the term subperiosteal can be criticized in a

FIG. 11

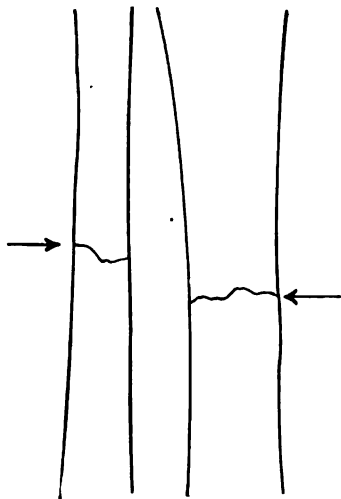
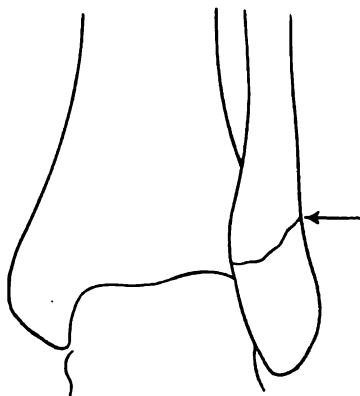


FIG. 12



clinical diagnosis because it is impossible, except by operation, to demonstrate whether the periosteum is torn.

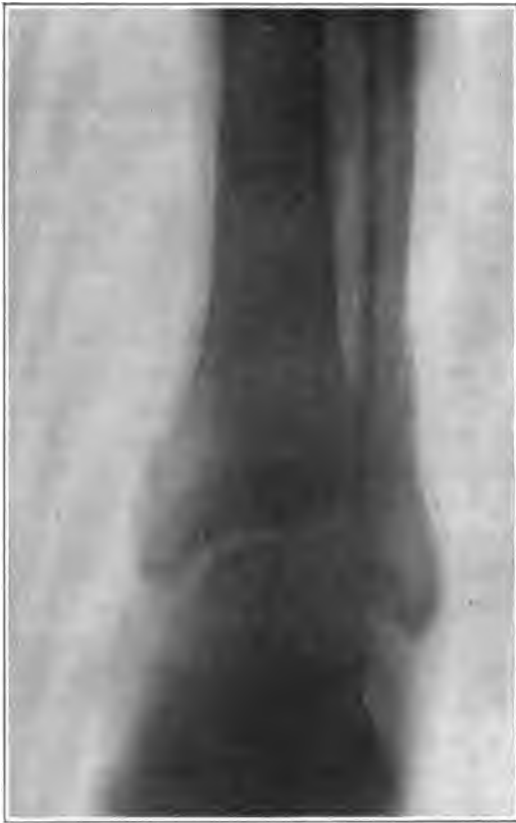
Fig. 12 is a good illustration of a fracture of the external malleolus without deformity, one in which, without the aid of *x*-rays, the patient would probably have been treated for a sprain, and in which without much doubt a flat-foot would have resulted. This patient, a man aged twenty-seven years, made a misstep, fell and twisted his ankle. At the examination there was a little swelling, some pain and tenderness over the malleolus, but no line of fracture.

Recently, I have had a somewhat similar observation. There was no displacement, but I did get crepitus; there was a little œdema and tenderness over the line of fracture, and one could make out that the line was not transverse. Crepitus was audible if I put a stethoscope near

the fracture and percussed gently above. The *x*-ray (Fig. 13) shows the spiral fracture above the malleolus in the shaft of the fibula.

AUSCULTATION AND PERCUSSION IN THE DIAGNOSIS OF FRACTURE. Johann Plesch,¹ of Budapest, as far as I am able to ascertain, must be given credit for a new method of diagnosis of fractures which is especially applicable to the variety of fractures which we have just discussed. The apparatus necessary is so much simpler than the *x*-ray that it will

FIG. 13



appeal to the practitioner as one which should be tried. The Plesch method rests upon the fact that bone will transmit sound. When the continuity of the bone is interrupted, but the ends are still in contact, the sound will differ; that is, it will be interrupted and lessened; if the bones are entirely separated the sound will probably be completely interrupted. For this reason if one places a stethoscope, or, better, a

¹ Deutsche Zeitschr. f. Chir., 1903, vol. lxi. p. 613.

phonendoscope, on one end of the bone and percusses at the other end, one will be able, when his hearing has been trained, to distinguish those differences in sound which indicate a fracture. Plesch's experiments on the cadaver and his practical experience are pretty conclusive that this method is accurate in regard to fractures, and he is inclined to the view that it can be amplified and made useful in the diagnosis and location of other bone lesions. In two instances he was able to localize a focus of osteomyelitis in the rib and tibia.

Another very important fact is that the sound will be transmitted through the neighboring joint. This is important because in some cases on account of the deep position of the bone, or of the surrounding traumatic swelling, it is impossible to place the stethoscope on the other end of the bone. For example, in a possible fracture of the surgical or anatomical neck of the humerus the head of the bone, if there be no swelling, is usually too deep for auscultation. Plesch has demonstrated that the sound will be transmitted and its variations audible if one places the phonendoscope over the acromion process and percusses over the lower epiphysis of the humerus. It is important always, of course, to compare the sounds heard on the affected side with those on the normal.

This method of diagnosis, if it prove to be accurate, is a very important one, and for this reason the following details of its application for diagnosis of fractures in different parts of the body are worthy of record.

In fractures of the skull one should listen on one side of the suspected area and percuss on the other. Experiments on the cadaver have demonstrated that the transmission of sound is influenced by the slightest crack in the skull, and completely interrupted by a fracture. In order to establish impaired transmission of sound, however, it is necessary to compare it with that over the corresponding point on the other side, since the sutures and fontanelles in children and youths, before ossification is completed, are apt to interfere with this transmission. Careful comparison will exclude this factor.

In fractures of the ribs, in which a probable diagnosis was heretofore the best that could be obtained, percussion over the sternum and, in thin individuals, on the rib, or over the spinous processes of the vertebræ, with auscultation over the rib, will diagnose and locate a fracture.

In pelvic fractures percussion is indicated over the crests of the ilium, anterior spines, os pubis, os coccygis, or other areas directly accessible.

A fracture of the scapula can be located by percussion of the acromion, coracoid process, the spine, or the angulus. In fractures of the clavicle the seat of the fracture will determine the place of auscultation.

When the upper arm is fractured in the diaphysis, one of the condyles; when the fracture is in the surgical or anatomical neck, the acromion; when in the condyles the olecranon of the ulna should be percussed.

In fractures of the forearm involving the lower part of the ulna or radius, or the styloid process, we auscultate on the thenar or hypothenar of the well-extended hand, according as we wish to examine the ulna or the radius.

It will probably be impracticable to employ the method in fractures of the carpal, metacarpal bones and phalanges on account of their small size, though theoretically this should be possible.

Among fractures of the lower extremity, those of the neck of the femur deserve special attention on account of the difficulty of differential diagnosis between fracture and dislocation by the old methods. The sound produced by percussion on the patella, the condyles, or the trochanter will be transmitted to the bone of the corresponding side of the pelvis when the head of the femur is in the acetabulum and the bone is not interrupted in its continuity. When the bone is fractured it will show a change in the transmission of the sound as compared with the other unaffected side. The sound may also be transmitted to the opposite end of the bone by percussion on the prominence of the pelvis. The method will, therefore, aid in the differential diagnosis between fracture and dislocation of the femur where other methods fail.

As regards its employment in fractures of other bones of the lower extremity the same principles apply as those discussed in connection with the upper extremities.

INCOMPLETE FRACTURES. This term is frequently incorrectly used and it is somewhat hard to define. Stimson in his classical work divides incomplete fractures into (1) fissures, (2) the true incomplete, other terms for which are the green-stick, infraction, bent-bone, or curvature without fracture; (3) depressions, (4) separations of a splinter. Von Bruns has demonstrated that in young children a bone may be bent almost to a right angle and after the force of the bending has ceased it returns to almost its normal position without any definite separation of its continuity. According to the experimental work of Gurlt an infraction is a fracture in which the continuity of the bent bone is partially or completely interrupted; at the concave side of the bend the corticalis is folded into a ridge; at the convex, opposite side, there is a separation.

Apparently there is every degree from a bending to a complete fracture, and recent x-ray studies illustrate a fracture which may be considered less in its extent than the true infraction of Gurlt. Kohl¹ reports, with illustrations, from the surgical clinic of Leipzig a few of these cases which he calls a special form of infraction with folding of the corticalis of bone. He has had three such observations, all in children between five and eleven years of age. In these cases the direction of

¹ Deutsche Zeitschr. f. Chir., 1905, vol. lxxvii. p. 383.

force was apparently identical to that which would produce a Colles' fracture in the adult. The children fell on the plantar surface of the fully extended hand, with the forearm fully extended. This, of course, would tend to bend the radius with the convexity on the extensor side and concavity on the flexor side. Apparently in this bending the tension force of the concave side of the bend stretches the lamellæ of bone, but does not produce any fracture, at least not enough separation of continuity to be made out in the *x*-ray picture. The picture is taken from the flexor side of the radius, but on the extensor side, the concavity of the bend, the pressure forces the cortical bone together and produces a folding or wrinkling. These cases are of interest as rare forms of fracture. Clinically there is no deformity, but localized tenderness and a little swelling about the radius 3 cm. above the styloid process. They can be recognized only by the *x*-ray; reduction under anæsthesia is unnecessary, a simple fixation dressing for ten days or two weeks being sufficient for the proper treatment. If in these cases the force is greater or the individual is older the convex flexor side of the radius gives way and we have a true infraction, but the folding of the cortical bone on the opposite concave side is also present. The patient in this case was older, seventeen; in addition to the local tenderness and swelling there was a slight deformity. The *x*-ray shows well the folding of the cortical bone, the ragged line of fracture and the slight angular displacement. In this case it was necessary to give ether and reduce the deformity. In looking over his *x*-rays Kohl was able to find one other case of this special form of infraction. The ridge of cortical bone is well illustrated here at about the surgical neck. In this case there was no deformity and no restriction of motion at the shoulder-joint, no symptoms except tenderness and swelling about the bone a few centimetres below the head.

I have discussed these cases because they are the first to appear in the literature. Whether such a fracture can occur at the neck of the femur and later develop into traumatic coxa vara we have no observations to decide.

THE OPERATIVE TREATMENT OF FRESH SIMPLE FRACTURES. This subject we have previously discussed, taking a rather conservative view. Since this time the most extensive and, I am inclined to think, the best presentation of our views in this matter has appeared by Fritz König,¹ in Altona. His historical review and discussion of the literature are well worth reading. However, we shall confine our remarks entirely to the indications for operative interference which König from his own experience and that in the literature considers justifiable.

¹ Archiv. f. klin. Chir., 1905, vol. lxxvi. p. 725.

In my discussion of the treatment of compound fracture I brought out the fact that non-interference was now the accepted view of the authorities and that extensive operative interference was only justifiable in certain selected cases. With this knowledge the general practitioner has, with the proper use of antiseptics, all that is necessary for the proper treatment of the majority of cases of compound fractures. The same is true in regard to fresh, simple fractures. The great majority of these cases are best treated by reduction under narcosis and a simple splint and extension dressing to keep the fragments in place. In the selected group of cases, for which an operation is indicated, this operation is better performed after a delay from five to ten days after the injury, or, in some cases, as König states, two weeks. The general practitioner, therefore, has ample time to study these cases carefully clinically, get his *x*-ray pictures, and decide whether this case under treatment belongs to the group in which operation is indicated.

The first requisite for operation in this group of cases is an environment in which absolute aseptic surgery is possible. With modern surgical technique the danger of infection in these cases is so small that it need not be considered as a contraindication for operation. However, when such an environment is not possible and the one treating the fracture has not had considerable experience, the possibility of a bad result in the healing of the fracture does not weigh against the dangers of infection during the operation.

The chief indication for operative interference in a fresh simple fracture is a dislocation of the fragments which cannot be reduced and this reduction maintained, provided that healing in the unreduced position will interfere with proper function. For example, in some of the oblique and spiral fractures of the shaft absolute reduction, that is, perfect anatomical adaptation of the fragments, is impossible. However, in many cases, there is good healing, and the deformity is so slight that it does not at all interfere with the function of the limb. In previous numbers of *PROGRESSIVE MEDICINE* I have discussed these spiral and oblique fractures of the long pipe bones and have advocated the conservative treatment similar to König. It is quite true that there is no special objection to operation to allow a more perfect apposition of the fragments, but it is unnecessary, except when the *x*-ray shows wide separation, or a deformity which, if healing were to take place in its direction, would interfere with function. As a matter of fact, therefore, in fractures of the shaft operative intervention is less frequently indicated than in fractures near the joints. In oblique fractures of the upper third of the shaft of the femur the upper fragment is so frequently dislocated forward and the lower fragment pulled up by the strong muscles that it is impossible, in many cases, even with the heaviest extension in a

forced flexed position, to maintain apposition. For this reason operation is distinctly indicated.

In all fractures in the neighborhood of joints a slight dislocation of the fragment, if it heals in this position, interferes with perfect function of the joint. For this reason results undoubtedly will be better if these cases are subjected to operation in the recent stage. However, it is to be emphasized that experience so far has demonstrated that the details of the operation in this group of cases are far more difficult than in operations upon the shaft of the long pipe bones. In all fractures of small bones of the foot and hand, tuberosities, etc., in which there is attached to the small fragment a muscle, which tends to keep that fragment apart, an operation is indicated. This is true in some fractures of the os calcis, the tubercle of the tibia, the great trochanter of the femur, and the tuberosity of the humerus.

The possibility of non-union of the apparently perfectly approximated fragments is so unusual and so difficult to prognosticate, that this cannot be considered, at least at the present time, as an indication for operation. As a matter of fact, we do not yet understand these unique cases; their occurrence is noted most frequently in the middle shaft of the humerus, and next, in the middle third of the tibia. It is difficult to believe that operative fixation would, in the recent state, give any better results. Experience teaches that after resection and wiring in these cases of non-union osseous union does not always take place. Of course, if one finds between the fragments fascia or muscle there is an explanation. This should show in the early x-ray and would be an indication. The causes of delayed bony union when the fragments are in perfect position are not well known. Among these causes, the majority of authorities agree, are two which are the fault of the surgeon in his treatment—one, the neglect of massage which improves circulation; and the other, prolonged fixation in too tight dressings which interfere with circulation. In the few cases of non-union which I have observed these two factors were present. Syphilis is another factor; this, however, can be recognized and treated. The relation of the thyroid gland to bone formation is now pretty well understood; thyroid extract is for this reason indicated in all cases of non-union. I have amplified this question of a possible non-union more than König. I agree with him that it is not an indication for operation, nor do I feel that delayed osseous union is an indication for interference. Given a case in which the bones are in apposition, usually the shaft, and in which after the proper time the union is not solid, this finding is not an indication for operation, but one for energetic massage, ambulatory treatment in the fixation dressing, thyroid extract, antisyphilitic drugs, and a treatment calculated to improve the general nutritive condition of the patient. In the few cases which I have seen

bony union has been accomplished after a time. In one case, the middle third of the tibia, the patient wore a support one year.

In two special fractures an operation is indicated without exception, if this can be done under the proper environment already referred to: fractures of the *patella* and *olecranon*. It is quite true that good results have been obtained without operation; it is also true that if the ligaments about these bones are not torn good function is obtained even with fibrous union. There is, however, no way in which we can tell to which class that patient under consideration belongs. It is safer, therefore, to operate upon these fractures. König mentions a preliminary treatment which should be emphasized. For five or ten days after the injury and before the operation the elbow or knee-joint should be given energetic massage.

The results in fractures of the neck and head of the femur are so uncertain and frequently so unsatisfactory that König considers them among those special fractures in which operation must be considered. I will discuss this difficult question later under special fractures in the neck of the femur.

Special Fractures. FRACTURES OF THE NECK AND HEAD OF THE FEMUR INCLUDING COXA VERA. König¹ in his discussion of the operative treatment of simple, fresh fractures, devotes more space to the subject of fractures of the neck of the femur in adults than to any other single fracture. In the previous numbers of PROGRESSIVE MEDICINE the literature on coxa vara has been fully discussed up to date, and along with this discussion fracture of the neck of the femur in adults has been considered. The operative intervention was suggested in certain selected cases. In recent years considerable experience has accumulated which is best discussed by König on fractures in the adult, and by Whitman² in children.

It is very difficult in a few words to give the present opinions on this subject. Everyone is aware that in fractures of the neck of the femur in adults treated by the usual method of extension or in a plaster-of-Paris cast we get various results. These results may at first be divided into two groups: (1) those with non-union, and (2) those with union. The cases of non-union are practically cripples. The anatomical result in the cases of union varies in regard to shortening, adduction, rotation, and limitation of motion. The functional result is somewhat in proportion to the anatomical. In many of the cases in which there is union the deformity is so great and function is so much impaired that the patients are almost cripples. The two questions, therefore, to decide are, how can we ensure

¹ Loc. cit., p. 762.

² Medical Record, New York, March 10, 1904, and Medical News, September 24, 1904, vol. lxxxv. p. 584.

union in all cases, and when we get union, how can we accomplish this without a resultant deformity which impairs function? In adults fractures of the neck of the femur, from the time of Sir Astley Cooper, have been divided into intra- and extracapsular varieties, impacted and non-impacted. When the line of fracture is entirely within the capsule, that is, when the fracture is the so-called subcapitalis of Kocher, union takes place in a few rare instances in which the fracture is impacted. It was König's study of a union in such an impacted subcapitalis fracture which lead him to the discovery of the essential feature of healing in these cases. In a case of anteroposterior section through the head, neck, and trochanter the patient had been treated for impacted intracapsular fracture with a good result; the patient died later from other causes. We observe that the head is united to the neck in a slightly dislocated position, that between the head and the neck, on the posterior half there is a distinct line of separation between the fracture surfaces, with no attempt at fibrous or bony union, while on the anterior half there is firm fibrous union between the fracture surfaces (trochanter).

In these fractures, according to König, there are two elements in healing—the bone and the soft parts about the fracture. Former experience has demonstrated if the bone only is fractured and the soft parts unruptured there is healing, because in this instance the loose head gets circulation from the unruptured soft parts as well as the ligamentum teres. Such instances are unique. When bone and soft parts both are torn the head is loose and receives nutrition only from the vessels in the ligamentum teres. This amount of circulation is insufficient, the bone atrophies, and we have as a result non-union and a loose head. In a few cases in which there is impaction the torn soft parts are brought in contact and we get fibrous union with function.

We can distinguish clinically and with the *x*-ray the fracture of the neck of the femur (subcapitalis) in which operation is indicated, from the other fractures, in which union practically always takes place. According to König we can distinguish the intracapsular subcapitalis fracture by the line of separation shown in the *x*-ray, by the greater outward rotation and greater mobility. The operation should be done within eight days after the injury and should consist not only in a bone suture, but a careful approximation and suture of the torn capsule. This method of König is based: first, on the result of the fibrous union; second, in the poor results when operation is performed late; and, third, in his one almost perfect result of an early operative intervention.

If the operation is delayed, there is so much atrophy of the neck or changes in the loose femoral head that although suture is possible the results are not as satisfactory as when the operation is performed early.

This atrophy of the neck in intracapsular fracture of the femur has been well known from the time of Gurlt.

In three cases, all old women, in which König operated after the fifth week, he removed the loose head. This has been the operation which Kocher and others have conceived as the only possible method of treatment. In two further cases, a girl of nineteen and an elderly woman, König again operated after the fifth week with his method of suture. In one the bone or the loose head had become so soft and in the other so eburnated that osseous approximation was unsatisfactory, but apparently on account of the suture of the capsule, although the *x*-ray demonstrates that the head has again dislocated, the functional result was a great improvement over non-union.

FIG. 14



FIG. 15



König, in his sixth case, with this experience and with his ideas crystallized, on the importance of early intervention and suture of the capsule, operated on a male of seventy within eight days after the injury. The result was practically perfect. Some time later this patient was readmitted to the clinic; he walked with a cane, with practically no limp, and could ascend and descend stairs. He was then suffering with tuberculosis of the lungs and ribs, and died from this disease in the clinic. At the autopsy it was possible to remove the upper end of the injured femur. Fig. 14 is a sagittal section through the anterior half; we observe the perfect approximation, and that in a few places bone lamellæ cross through the fibrous union from neck to head. However, when we make a similar sagittal section through the posterior half (Fig. 15), it can be

seen that there is no union. König attributes this to the fact that he only sutured the bone and the anterior portion of the torn capsule. In future cases he plans to suture, if possible, the torn portion of the posterior capsule.

Operative intervention is, therefore, indicated early in this form of non-impacted, intracapsular fracture of the femur.¹ This operation should be done within the first eight days. The upper end of the femur is easily exposed by an anterior incision separating the tensor vaginæ femoris from the rectus; the fracture is reduced; with marked outward rotation the posterior capsule is sutured, the fractured bone is approximated with some form of metal suture, or a nail or screw through the trochanter, then the torn anterior portion of the capsule is sutured, and the wound is closed; the leg is put up in slight abduction in plaster. The abduction must not be extreme; passive motion and massage are begun early about the tenth day. According to König, approximation of the bone only in this class of cases, no matter by what method, is insufficient.

Just what future experience will demonstrate as to the value of König's new method cannot be stated, but there is no question that the general practitioner will relieve himself of great responsibility if he will select this form of fracture from others of the neck of the femur, and turn them over early to the experienced surgeon, and so give the specialist an opportunity to see what can be done by operative intervention in these cases which in the past have resulted in non-union.

A clinical and experimental study of two Japanese—Ito and Asahara—from the surgical clinic of Kyoto¹ confirms the conclusions of Kocher that the only treatment for the subcapitalis intracapsular fracture is excision of the head of the bone. They summarize the consensus of opinion also expressed by König² that non-union is not due to the absence of coaptation between the bone fragments, but to the shutting off of the circulation to the head fragment because the capsule and periosteum are torn. For this reason they conclude with Kocher that no method of wiring the two fragments will result in union, because for union both fragments must have proper circulation. They miss in their investigation the important findings of König. Yet they have two observations which definitely prove König's view. Among their clinical cases they operated on a woman of seventy-four, within eight days after the accident, for an intracapsular fracture of the neck of the femur; they were prepared to resect, but they found the capsule untorn, and on opening the capsule they found a line of fracture at the junction of the neck and the head. They considered that the fracture was incomplete, no bone suture was done, the opening in the capsule was sutured, the wound healed, and the

¹ Deutsche Zeitschr. f. Chir., 1905, vol. lxxvi. p. 121.

² Loc. cit.

result has been practically perfect. Undoubtedly this would have happened without operation. This observation confirms König's view that these fractures heal if the capsule is intact. In their experiments on animals in which they produced this fracture the only union which they observed was one in which the capsule on the neck fragment had become fixed by an inflammatory process, perhaps the result of a slight infection to the head fragment. As these two publications were about simultaneous, the Japanese surgeons were not familiar with König's work. It has impressed me, however, as very significant and as a confirmation of König's view.

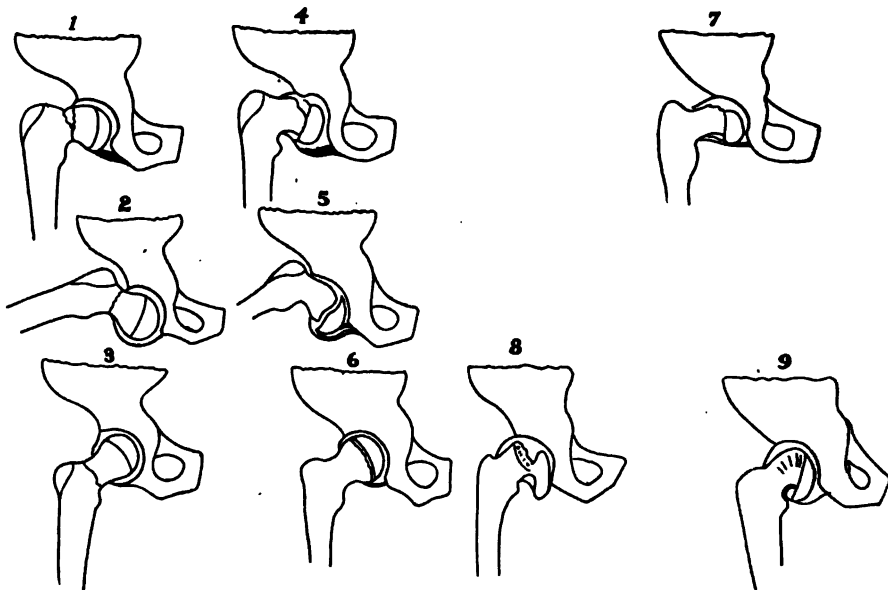
Whitman,¹ of New York, considers fractures of the neck of the femur in early life and advocates a new method of treatment which appeals to me very much: for fractures of the neck reduction and fixation in forced abduction, for epiphyseal separation operative reduction of the dislocated head. Whitman's previous communication on this subject has been discussed in *PROGRESSIVE MEDICINE* (December, 1903, p. 135). We shall not again discuss the difference of opinion between Hoffa with many other German authorities, and Whitman in regard to the frequency of fracture of the neck and epiphyseal separation. Hoffa and others are inclined to the view that fracture of the neck is rare in children, while epiphyseal separation is common. Whitman holds the opposite view. This question can only be settled by further anatomical studies. Whitman divides fractures of the neck in early life into three classes: (1) simple, direct fracture of the neck, usually incomplete, occasionally complete; (2) direct epiphyseal disjunction, usually incomplete, in rare instances complete; (3) an indefinite class in which the deformity is at or in close proximity to the epiphyseal junction; the patients are of a type in which the so-called static deformity of adolescence is common; an injury may be predisposing, aggravating, or the direct cause of the distortion. It is probably this classification that is the chief cause of difference between Whitman and Hoffa. German authorities class Whitman's last two varieties under the term traumatic coxa vara, which is a common lesion as compared with true coxa vara.

The following illustrations of Whitman (Fig. 16) represent clearly his view: fig. 1, a fracture of the neck of the femur; fig. 2, restoration of the normal angle by forced abduction; fig. 3, the limb in normal position; figs. 4, 5 and 6 should be compared with figs. 1, 2 and 3, as they illustrate complete separations of the epiphysis treated by the same method, and demonstrate that abduction increases the line of separation between the head and neck; fig. 7 illustrates a slight separation of the epiphysis in which simple protection might assure a satisfactory result; fig. 8 shows

¹ Loc. cit.

a more extreme displacement of the head, which can only be properly treated by open incision and reduction; fig. 9 represents the form of epiphyseal coxa vara which is often induced or aggravated by injury in which the deformity is most marked on the outer side of the epiphyseal cartilage.

FIG. 16



1. Fracture of the neck of the femur. 2. Restoration of the normal angle by forcible abduction. 3. The limb in normal position. 4, 5, and 6 illustrate complete separation of the epiphysis of the head of the femur treated by the same method. 7. Illustrates slight separation in which protection might assure a satisfactory result. 8. More extreme displacement, that can only be treated by direct operative reposition. This contrasted with fracture of the neck (1) illustrates the greater disturbance of joint function that must inevitably result. 9. A form of epiphyseal coxa vara often induced or aggravated by injury in which the deformity is most marked on the outer side of the epiphyseal cartilage.

Whitman's two groups, in regard to treatment, correspond to König's. In fracture of the neck of the femur, in children as in adults, operation is not indicated; in epiphyseal separation with displacement of the head, in children, operation is indicated to reduce the head, while in adults in the subcapitalis fracture operation is indicated to suture bone and capsule.

In children the two varieties can be differentiated clinically and with the *x*-ray. In fracture of the neck there is more shortening, less outward rotation, and the trochanter is more prominent; motion at the hip-joint is practically free, except in abduction, which is particularly restricted when the limb is flexed.

In epiphyseal separation the shortening is less, the outward rotation greater; frequently there is a swelling to be palpated in Scarpa's triangle over the position of the head; the trochanter is not as prominent, but motions at the hip-joint are always more restricted, due to dislocation of the head, and reflex muscle spasm due to the traumatic synovitis with effusion. Whitman gives illustrative cases of the results of treatment.

FIG. 17



His experience has been large, and his communication is one of great value.

I consider that the space just taken for the discussion of recent views on fractures of the neck of the femur is more than justifiable. No routine method of treatment will fit all cases. The general practitioner must learn to differentiate the cases in which operation is indicated from those in which conservative treatment is sufficient. The most neglected point in the treatment of fractures of the neck of the femur in which

bony union takes place is to allow the limb to assume an adducted position. Union in this position gives rise to an anatomical result which greatly impairs function, a point which I mentioned in the beginning of this discussion. For this reason the suggestion of Whitman should always be followed—forced abduction, whether the limb be fixed in plaster or the fracture treated by extension.

In Fig. 17 Ware¹ illustrates a good method of fixing the limb of a young child in abduction. It will be observed that the principles of the Middeldorpf² triangle are employed. If the fracture is unilateral the unaffected limb need not be included. This is the method advocated by Ware,³ who credits Dr. W. W. Van Arsdale with its introduction.

COXA VARA. This subject, which was introduced in 1899 and last mentioned in 1902 with the discussion of Hoffa's communication, has not lost its interest. Recent communications, however, have added nothing particularly new to our knowledge. Freiberg's⁴ communication on coxa vara and osteoarthritis deformans is of interest in confirming Maydl's observations, which were the first made. Freiberg's *x-ray* pictures are unusually good. We must bear in mind the difficulty in some cases of differentiating coxa vara in the young adult from arthritis deformans of the hip-joint. I will discuss this subject again in the section on joint surgery. Hoffa⁵ reports some interesting cases of congenital coxa vara which were first observed by Kredel⁶ in 1896. The lesion is usually bilateral or may be associated with a congenitally dislocated hip on the other side. Blecher⁷ reports some interesting cases of coxa vara in young adults between twenty and twenty-two, agreeing in every respect with Hoffa's views. Siebs⁸ reports similar cases. The most recent discussion from an etiological and pathological standpoint, with illustrations, is given by Schlesinger.⁹ He concludes that at the present time there is no evidence to allow the deduction that the femoral neck in these cases is the seat of localized rickets or osteomalacia. This, of course, is but a simple confirmation of Müller's and Hofmeister's view. Senn's¹⁰ summary of the differential diagnosis between coxa vara and other affections of the hip-joint, read before the Pan-American Medical Congress, presents a clear and concise description of the present views.

¹ *Annals of Surgery*, August, 1905, p. 259.

² *PROGRESSIVE MEDICINE*, December, 1902, p. 103.

³ *Annals of Surgery*, August, 1905, vol. xlii. p. 257.

⁴ *American Journal of Orthopedic Surgery*, July, 1905, vol. iii. p. 6.

⁵ *Centralbl. f. Chir.*, 1905, vol. xxxii. p. 677.

⁶ *PROGRESSIVE MEDICINE*, December, 1899, p. 250.

⁷ *Deutsche Zeitschrift f. Chir.*, 1905, vol. lxxvii. p. 302.

⁸ *Centralbl. f. Chir.*, 1905, vol. xxxii. p. 791.

⁹ *Archiv f. klin. Chir.*, 1905, vol. lxxv. p. 629.

¹⁰ *Journal of the American Medical Association*, June 10, 1905, vol. xlv. p. 1821

COXA VALGA. Max David,¹ of Berlin, in reporting the first observation of a case of congenital coxa valga, considers the literature up to date. His remarks in regard to coxa vara agree with the statements which I have just made, that is, the problems in the etiology, pathology, and treatment of this interesting disease first studied by Müller, Hofmeister, and Kocher are well established. The literature is large. On the other hand, the reverse is true of coxa valga. The literature is scanty; it begins with a communication of Albert,² since which time there have been a few isolated observations by Manz, Hofmeister, Lauenstein, Thiem and others. The patient was a child, aged five years, who on examination exhibited a bilateral deformity; abduction, outward rotation, and restricted adduction; there was also hyperextension at the knee-joint. The child was otherwise perfectly healthy. The peculiar wabbling gait with legs apart was observed by the parents from the moment the child began to walk. The treatment consisted in fixing both limbs in plaster in an overcorrected position—adduction and internal rotation—and in this plaster the child was allowed to walk. The result was a distinct improvement. Anatomically the x-ray shows a slight correction, functionally the child walks very well.

Coxa valga, or, better, collum valgum (Albert), is not a disease *per se*, like coxa vara, but is a change in the neck of the femur, rarely observed, in a number of conditions. When for any reason, due to paralysis, disease of the knee-joint, or amputation of the limb, the leg hangs and does not carry weight, this change in the neck of the femur has been observed by Albert and others in museum skeletons. It has been observed by Thiem after fractures in the neck of the femur. Lauenstein observed it in a case of rickets. Hoffa has observed this change of the neck in congenital dislocation of the hip.

FRACTURES OF THE SHAFT OF THE FEMUR. On the whole these fractures are easy to recognize and to reduce. The best method of treatment is simple extension, with the thigh fixed in coaptation splints, a method illustrated in every text-book on fractures. In young children it is better to have the leg extended in the vertical position; in nursing babes plaster will have to be used. Under the operative treatment of simple fracture we have mentioned that a fracture in the upper third of the shaft of the femur may be associated with such a great dislocation of the upper fragment that an operation is indicated.

The more difficult fractures of the shaft to treat, and which can be recognized only with the x-ray, are the spiral or torsion fractures. In *PROGRESSIVE MEDICINE* for December, 1903, p. 141, I discussed Dietzer's

¹ Zeitschr. f. Orthoped. Chir., 1904, vol. xiii. p. 360.

² *PROGRESSIVE MEDICINE*, December, 1899, p. 246.

experience from Bardenheuer's clinic. Spiral fractures of this bone are less frequent than of the tibia, but by no means uncommon. They occur chiefly in children under ten years of age and usually involve the middle third, less commonly in young adults, when they are apt to be situated in the lower third; while in older people the few observed cases have been near the junction of the middle and upper third. In the most recent contribution on spiral fractures by Max von Brun,¹ from von Bruns' clinic, I find excellent *x-ray* studies of this fracture of the shaft of the femur. This gives me for the first time an opportunity to reproduce some of them, as they should be of great interest to the general practitioner, as well as to the surgeon. In this clinic one-sixth of all fractures of the femur were of the spiral variety (nineteen cases). The age agrees with Dietzer's observation: twelve patients were under ten years of age, the others scattered from ten to sixty.

It is interesting to note that two fractures among this number were compound; in both the conservative method of treatment was employed with excellent results. In one case the external wound, due to a sharp fragment of bone, was so small that the wound was simply covered with an aseptic dressing. In the second case, in which the leg was caught between the hub of a wagon and a curbstone, there was a large wound above the knee on the inner side. Undoubtedly in this case the crushing force had more to do with the laceration of the soft parts than a fragment of bone. The physician, who saw the patient at once, stated that there was a serious hemorrhage and ligated the two ends of a large artery torn across. When the patient was admitted to the clinic the ligated vessels could be seen in the wound, and the patient showed evidence of great loss of blood. Nothing was done but simple disinfection of the wound and iodoformized gauze tampon. There was no disturbance of healing and no signs of infection, except a thrombosis of the femoral vein, which was observed on the thirty-third day, but which did not complicate the healing of the fracture.

In studying these nineteen cases critically I was anxious to ascertain if in any of the cases better results could have been obtained by immediate operation. In this group of cases in von Bruns' clinic the treatment employed was simple extension, with some method of fixation of the thigh, usually Volkman's splint, the principles of which are similar to the coaptation splints which I have recommended. As a rule, after from fourteen to twenty-four days, the consolidation is sufficiently firm to allow the patients to be placed in a plaster cast and leave the clinic on crutches. In four cases there was no shortening; in the remaining cases the shortening varied from $\frac{1}{2}$ to 3 cm. The worst result was then less

¹ Beiträge zur klin. Chir., 1904, vol. xlv. p. 655.

than an inch and a half shortening. In children, however, 2 cm., almost an inch, should be considered a sufficient amount of shortening to desire a better method. Dietzer admits also an average amount of shortening of 2 cm. As his cases were treated in Bardenheuer's clinic, where the extension method may be considered to have reached its best development, we may conclude that these results are as good as can be obtained by extension. For this reason I would suggest that it would be advisable to explain to the patient or the family that after the non-operative treatment in these cases a certain amount of shortening usually results.

FIG. 18



Theoretically, an operation in the recent state would undoubtedly allow a better correction of the overlapping which is so difficult to overcome by the extension method. Unfortunately neither my own experience nor that in the literature gives a sufficient number of cases to allow a comparison. In addition the depth of the shaft of the femur and the frequent proximity of the fragments to Hunter's canal makes an operation theoretically more serious than upon fractures on other bones or in the lower and upper third of the femur.

Fig. 18 is a good illustration of a fracture difficult to treat by extension. In this case, in a child of seven years, the shortening at the end of two and a half weeks was 3 cm.; at this time the bone was refractured and an

attempt made to lessen the shortening, but the patient left the clinic in plaster without further measurements, so there is no record. In this case the extreme overlapping of the fragments is beautifully shown in the *x*-ray. A second *x*-ray, after extension, if it had been made, would have at once indicated the faulty position. I believe that an operation in this case would have given a better result.

Fig. 19 is of great interest, because the line of fracture and the three fragments correspond to an observation of my own on the humerus.¹ This patient was a child aged four years; the limb was broken by a direct force, associated with torsion. It was treated with simple extension, and

FIG. 19



a perfect result obtained; solid healing in three weeks. In my observation on the humerus I found, after placing the arm in full extension and fixing it in the usual way to the side of the body, that the fragments which were considerably separated² remained unchanged.³ For this reason I exposed the fracture by open incision; on account of the deep position of the humerus and the proximity of the musculospiral nerve wiring would have been difficult. In manipulating the arm I found to my surprise that when the arm was placed in extreme abduction (away from the body) the three fragments at once came in perfect position. When the arm was placed against the side of the body the fragments again separated. For this reason I put in but a single wire, which by itself would not have

¹ PROGRESSIVE MEDICINE, December, 1903, Figs. 1 and 2, Plate I. p. 142.

² Loc. cit., Fig. 1.

³ Loc. cit., Fig. 2.

held the fragments together, and fixed the fracture on the Middeldorpf triangular splint.¹ There was solid union in three weeks, without deformity and without shortening. The point that I wish to emphasize about these spiral fractures is that even if there be comminution solid union takes place quickly; the chief difficulty is to overcome the overlapping. Our experience will not allow us to select from the first *x*-ray examination the cases which are better treated by open incision. After the fracture has been reduced and a proper extension treatment applied, a second *x*-ray examination will inform us whether adaptation of the fragments is sufficiently good to justify a continuation of the extension treatment. Otherwise operation is indicated.

FIG. 20



Fig. 20 demonstrates the extreme degree of a torsion fracture with comminution. This is one of the compound fractures previously discussed, in which the limb was crushed and a large artery torn. This case was also treated by simple extension, with a resultant shortening of only 3 cm., which must be considered, from the nature of the fracture, a good result. It impresses me that if this had been a simple fracture one would not have hesitated to operate, but in view of the large wound it was a wiser plan not to interfere.

¹ PROGRESSIVE MEDICINE, December, 1902, p. 103.

FRACTURES OF THE LOWER END OF THE FEMUR. I can find little in recent literature on this subject. As a rule, the fragment or fragments can easily be reduced and kept in place. Fixation in plaster in a slightly flexed position usually is the best method of treatment. The bandage should be changed frequently for massage and passive motion. Separation of the lower epiphysis of the femur is not uncommon. In a recent communication by Kirmisson,¹ which was discussed before the French Surgical Congress in 1904, the subject of epiphyseal separation was brought up to date since Poland's monograph in 1898, when he collected 700 cases. Traumatic separation of the epiphysis is most common in the lower end of the femur and radius and the upper end of the humerus, chiefly observed between the ages of twelve to fifteen years, and now and then up to twenty-five years, very rarely under twelve years of age. The injury is usually produced by torsion from indirect force. Operative correction is frequently indicated because of the impossibility of reducing the epiphyseal fragment. As a rule, this difficulty is met with most commonly in the lower epiphysis of the femur. Contrary to previous views, impaired growth is not observed in the majority of cases. The cartilage usually remains attached to the diaphysis.

Summa² reports an observation in which the lower epiphyseal fragment was completely dislocated forward. Summa's patient, a boy aged seventeen years, sustained this fracture by direct force. The clinical picture was almost enough to make a diagnosis. The knee was overextended, the tubercle of the tibia very prominent, there was greatly increased lateral motion of the knee-joint, but no crepitus. The knee could be overextended at will; reduction under ether was found to be impossible. The fracture was then reduced by an incision into the knee-joint and direct pressure on the epiphyseal fragment. The result has been practically a perfect one. Summa quotes three other cases from the literature, which by no means cover all the reported cases.

The only case observed in Dr. Halsted's clinic was operated on by Finney. He found that reduction of the lower fragment was accomplished after open incision, by overextension, then traction with flexion.

FRACTURES OF THE PATELLA. Thiem's³ contribution, read before the Thirty-fourth German Surgical Congress in April, 1905, presents this subject not only historically, but with the present day's views. The discussion which followed the reading of this paper⁴ demonstrates that the consensus of German opinion agrees with that in this country, that the best results are obtained by open incision and suture in the recent

¹ *Revue d'orthop.*, 1904, No. 6.

² *Deutsche Zeitschr. f. Chir.*, 1904, vol. lxxii. p. 321.

³ *Archiv f. klin. Chir.*, 1905, vol. lxxvii. p. 730.

⁴ *Centralbl. f. Chir.*, 1905, vol. xxxii., No. 30, Supplement, p. 114.

state. Even in the older cases with separation of the fragments the function of the limb can be very much improved by suture. In cases in which there is such wide separation that a plastic operation has to be performed on the rectus muscle to bring the fragments together, the results obtained in the majority of cases justify the procedure. The general practitioner, therefore, should inform his patient, with a recent fracture of the patella, that the probabilities of union with function after non-operative treatment is very slight, and the results of the operation in the later period are not as good as those in the recent state. If it is impossible to place your patient in the proper surgical environment for operation, put no faith in any special apparatus or plaster dressing. Place the limb extended on an inclined plain, flexed at the hip, have the knee and quadriceps muscles massaged daily, let the fragments take care of themselves. The best functional results are gotten by this method of treatment. This is the proper preliminary treatment during the first six or ten days before operation. It is practically impossible to prognosticate the result of non-operative treatment. Good results have been accomplished, but there is no question that if the operation can be performed properly best results are obtained. At the operation, in the recent state, the bone should not be sawed, suture of the ligament is sufficient, although there is no objection to bone suture. In every case, if the lateral portion of the quadriceps tendon on each side of the patella is torn, it should be sutured. In these cases begin massage on the tenth day after the operation, slight passive motion in the second week, considerable passive motion in the fourth week; get your patient out in the fifth week. With the proper suture bony union seldom fails, and with this early massage and passive motion the function of the joint is rapidly restored. In older cases, in which the fragments are separated by fibrous tissue, a thin zone of bone must be removed with the saw from each fragment, bone suture is required; in addition, always suture the ligament to each side of the patella. When the fragments are widely separated they can be brought together by lengthening the quadriceps with a plastic operation, the details of which I will consider next year, with the report of cases. My own illustrations are not yet prepared, and I can find none in the literature. My last result of a case of this character was bony union with flexion of the knee-joint, possible to a right angle, a practically perfect result, especially as the opposite patella, which was less separated, was also sutured with perfect joint function.

FRACTURES OF THE BEAK-SHAPED PROCESS OF THE TIBIA. My attention was called to this fracture in 1903 by Schlatter's communication.¹ Since then Winslow² has reported a case with beautiful *x-ray* studies,

¹ *PROGRESSIVE MEDICINE*, December, 1903, p. 145.

² *Annals of Surgery*, February, 1905, vol. xli. p. 278.

which he was good enough to write me about. Ware¹ also reports a case with good *x*-rays. Cassidy,² of Baltimore, has observed two cases which I had the opportunity to see clinically. This lesion is also considered by Osgood,³ of Boston. These communications confirm the statements of Schlatter and the remarks made in *PROGRESSIVE MEDICINE*, December, 1903. In my remarks on Dr. Cassidy's paper I called attention to the fact that Winslow's patient was the only one on whom an operation was performed, and comparatively in this case the patient made a more rapid recovery. Ware's case is of interest, because the patient came under observation six hours after the trauma, and with proper treatment fixation of the knee was saved from the late discomforts, observed in all these cases not treated in the recent state. Winslow's and one of Cassidy's cases were bilateral lesions. Fig. 21 illustrates the clinical picture. The

FIG. 21



enlargement of the right tubercle is most pronounced, and it was this one which gave the patient the greatest discomfort and in which the *x*-ray showed the most marked lesion.

A case reported by Wollenberg⁴ demonstrates that the treatment in the recent state does not always ensure the patient from future trouble. When this patient was seventeen years of age (the age of ossification of the beak-shaped process is from eighteen to twenty years), while about to jump with the knees in flexion, he felt a severe pain in the left knee. Examination demonstrated that the patella was higher, the *x*-ray showed

¹ *Annals of Surgery*, November, 1904, vol. xl. p. 739.

² *Maryland Medical Journal*, August, 1905.

³ *Boston Medical and Surgical Journal*, January 3, 1903, vol. cxlviii. p. 114.

⁴ *Deutsche med. Wochenschr.*, 1904, No. 43; *Centralbl. f. Chir.*, 1905, vol. xxxii. p. 157.

a fracture of this beak-shaped process. The leg was treated in extension, with adhesive straps pulling down the patella, and massage, with an apparently good result. Six years later, however, he had a recurrence of pain. The *x*-ray showed that the fragment was still separated by fibrous tissue, and appeared to be much enlarged by bone growth. I am inclined to think that in the recent state fixation and extension should be maintained at least six weeks. In the cases observed later the excellent and quick result in Winslow's case suggests that operative intervention with removal of the new-growth of bone will give the best results.

PROGNOSIS IN FRACTURES OF THE LEG. One interested in accident insurance and the duration of disability after a fracture of one or both bones of the leg will find the subject considered in the most minute details with large statistics by Sauer.¹ I must confess that I was much surprised to find that full ability to work is noted in over 75 per cent. of the cases only after an average of 16.4 months.

Of those cases who have not acquired complete ability to work within fourteen weeks after the accident, in 70 per cent. the average partial disability lasts 22.4 months. Age is a most important factor. All of the cases up to twenty years get complete function between twenty and thirty, five-sixths; between thirty and fifty, two-thirds to one-half; over fifty, only one-third. I cannot discuss this article in detail, but these statements are startling. In a large surgical clinic we seldom follow our fracture cases treated in the ward after they leave the hospital. In my own experience with cases which I have treated in my private practice I have never observed such a long disability. There is a very significant remark in Sauer's communication. He states that the disability is due to atrophy of muscle and restricted joint function, and then remarks that this occurs in spite of massage and passive motion. In my own observation, if the fracture is frequently dressed, the leg given proper and frequent massage and the joints passive motion, joint function and muscle tone are almost as good when bony union is accomplished as before the fracture took place. In the public-ward service it is practically impossible to have this treatment carried out. This monograph of Sauer emphasizes that fractures are lesions which, even though properly treated, may incapacitate the individual for months from the pursuit of his usual occupation, especially if he belongs to the laboring classes. It is a subject which should be discussed between the hospital trustees and the medical staff to see if appropriation cannot be obtained to give these patients proper massage and exercise.

SPIRAL FRACTURES OF THE TIBIA AND FIBULA. Since my review, with illustrations, of Lauenstein's and Zuppinger's communications on

¹ Beiträge zur klin. Chir., 1905, vol. xlv. p. 184.

this subject, I find two very extensive, almost monographic, contributions, one by Bayer,¹ from the surgical clinic of Bardenheuer, in Cologne, and the second one, more recent, by Max von Bruns.² The part of this second article, which deals with spiral fractures of the femur, I have discussed with illustrations. The chief part of both of these publications consists of numerous *x-ray* studies and detailed cases of spiral fractures of the tibia and fibula. However, the illustrations produced in *PROGRESSIVE MEDICINE* for December, 1903, need no additions. As von Bruns remarks, his contribution, from the large experience of the Tübingen clinic, confirms the views of Dietzer, Zuppinger, Lauenstein, and Bayer. The important factor to emphasize is that modern *x-ray* studies have confirmed the statement of von Bruns', in 1884, that spiral fractures are by no means uncommon. The importance of this fracture to the general practitioner is that it is more difficult to completely reduce and to accomplish union without shortening or deformity, and the question naturally arises, When is operative intervention indicated? At the present time our experience is not sufficient to select the cases at the first *x-ray* examination, but only at the second, after the reduction for operation. I thought perhaps Sauer,³ in his study of the ultimate results of fractures of the bones of the leg, would throw some light on the subject, but he does not. He compares, as carefully as he can, the results of treatment with fixation of splints and Bardenheuer's extension. He comes to the conclusion that in some cases the extension treatment gives the better results. For two or three years I have been considering the advisability of discussing, with illustrations, Bardenheuer's extension treatment of fractures.⁴ It impressed me as complicated and as impossible for general use outside of a hospital ward. Sauer states that it needs constant supervision, and in many cases they returned to splint dressings. As I have not used this method in fractures of the leg, I am not yet prepared to discuss it. The important conclusion for the general practitioner is, that in surgical clinics with large experience the results in fractures of the leg are by no means as good as desired. But as yet it has not been demonstrated that operation in the recent state in selected cases will improve these results. At the present time I should advise careful reduction under narcosis, fixation of the leg in a light splint, frequent dressings with massage and passive motion, plaster dressing at about the third week; this dressing should be changed at least once a week, with massage and passive motion. The *x-ray*, if possible, should be used if not before, at least after, the attempt at reduction under narcosis. If the approxima-

¹ Deutsche Zeitschr. f. Chir., 1903, vol. lxi. p. 524.

² Loc. cit.

⁴ Zeitschr. f. Orthop. Chir., vol. xii. p. 107.

³ Loc. cit.

tion of the fragments is not good the case should be referred to expert surgical advice.

FRAGMENTATION OF THE DISTAL END OF THE ANTERIOR EDGE OF THE TIBIA. Sachs,¹ in reporting with illustrations this rare fracture near the ankle-joint, collects five other cases from the literature. As in some of the cases a second operation was necessary to chisel off the projecting

FIG. 22



border of the dislocated fragment, I am inclined to the view that it is a fracture in which operation in the recent state may give better results.

In a recent observation of my own, in which there was a typical Pott's fracture, the *x*-ray demonstrated a fragmentation of the tibia. This fragment did not move forward with the dislocated tibia. As perfect reduction was accomplished under narcosis and confirmed by the *x*-ray, an operation was not performed. The ultimate result has been a perfect

¹ Deutsche Zeitschr. f. Chir., 1904, vol. lxxv. p. 365

one. Fig. 22 is a lateral view before reduction, and Fig. 23 after reduction.

FRACTURES OF THE HUMERUS AND ITS RELATION TO RADIAL NERVE PARALYSIS. A glance at any anatomy will find an illustration of the relation of this nerve to the shaft of the humerus. The most recent and complete study of this subject has been presented by Fessler,¹ of Munich. Fig. 24 shows how the radial nerve was caught and over-

FIG. 23

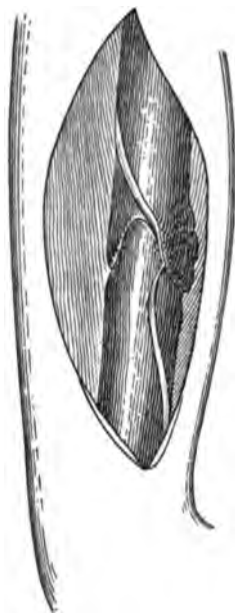


extended by one of the fragments in a fracture of the shaft of the humerus. Nerve injury associated with a fracture is a very distressing complication. Fortunately, it is rather infrequent; perhaps the injury of the radial nerve in fracture of the humerus is the most common; that of the ulnar nerve in fracture of the lower end of the humerus next. The most extensive involvement of nerves associated with a fracture is observed in a certain number of cases in fractures of the clavicle in which the depressed fragment or the callus involves the brachial plexus. Fessler

¹ Deutsche Zeitschr. f. Chir., 1905, vol. lxxviii. p. 60.

recognizes three forms: the primary, in which the paralysis comes on at once, due to contusion or tearing of the nerve; secondary, in which the paralysis is observed weeks or months after the fracture and may be due to various causes—in simple fracture to callus formation, in compound fracture to the secondary inflammatory process of bone or soft parts. In addition he recognizes a third form which he calls intermediate. . In this group the nerve is injured not at the time of the fracture, but hours or days later, due to overstretching over the dislocated fragment or its injury in the healing process. This group, apparently, is the most common—34 cases. Of the primary type he was able to collect 18, of the secondary 12 cases, while in 15 instances the paralysis could not be classified. If a careful examination is not made at the time of the accident a nerve injury can easily be overlooked. It should be the routine practice in every case of fracture to make a careful examination as to sensation and muscle function. The practical question is what is the best course to pursue when there is evidence of loss of function of a nerve in the neighborhood of the fracture, especially if it is a motor nerve. There is some difference of opinion in regard to the time of operation. If it is a simple fracture and the paralysis is primary one can wait a few weeks. In the meantime the fracture should be completely reduced and kept in extension. If the paralysis is due to simple contusion or overstretching and the continuity of the nerve is not destroyed recovery will take place without operation. If function, however, has not returned after a few weeks the nerve should be explored and isolated; if torn, sutured. In compound fracture, where there is an open wound and the wound is a small one, the treatment should be the same as in the simple fracture. If the wound is a large one, not infected and seen early, the attempt should be made to find, isolate, or suture the injured nerve at the primary operation. However, if the wound is infected, one should pack and wait until the inflammatory process has subsided. It is impossible to distinguish clinically whether the nerve is injured by compression or separation of its continuity. For this reason, in all cases, the sooner the operation is done, after waiting a short interval, the better. The results are uniformly good. It is sometimes very difficult, in older cases, to isolate the nerve from the scar tissue or callus. If the nerve is destroyed for some

FIG. 24



distance it is justifiable to resect the humerus sufficiently to bring the ends of the nerve together without tension.

In a case of spiral fracture of the humerus¹ I found on exploring the fracture in the recent state that the radial nerve was so near the fragments that "in order to prevent this nerve from being caught in the subsequent callus the triceps muscle was separated, the nerve pushed into this groove and held in place with catgut sutures." Paralysis did not develop. This procedure might be a good one in all operations. In this way the nerve lies in a bed of muscle and cannot be involved in the subsequent inflammatory process of healing. My second observation was on a gunshot wound of the arm in a child of five. The shot tore a hole through the arm, removing a piece of bone and soft parts. At the primary examination there was evidence of paralysis of the musculospiral nerve. In view of the extensive injury it was considered best to pack the wound. The operation was performed ten days later. The two ends of the nerve were found with some difficulty. The separation was about 4 cm. As a piece of the shaft had been carried away by the shot resection was not necessary to bring the ends of the nerve together. After the suture the nerve was embedded in the triceps muscle, as in the previous case. This patient left the hospital five months after operation. At this time there was distinct evidence of nerve regeneration. The bone had united firmly and the child had perfect use of the shortened arm, except the muscles, which produced extension of the wrist and fingers. At the present time (September, 1905, one year later) there is good result.

Pathological Fractures. Grunert's² contribution to this subject is probably the most complete since von Bruns' article in 1886. It is written from the surgical clinic of Habs in Magdeburg. Dr. Grunert is a military surgeon assigned to this clinic.

He refers to two previous monographs on this subject, by Gurll³ and von Bruns,⁴ and considers the etiology of pathological fractures under the following headings:

I. Fractures associated with local lesions of bone.

A. Tumors.

- a. Primary and metastatic sarcoma.
- b. Metastatic carcinoma.
- c. Adenocarcinoma from the thyroid.
- d. Solid enchondroma and benign bone cysts.
- e. Echinococcus cysts.

¹ PROGRESSIVE MEDICINE, December, 1903, p. 122.

² Deutsche Zeitschr. f. Chir., 1905, vol. lxxvi. p. 254.

³ Handbuch der Lehre von den Knochenbrüchen, 1862.

⁴ Die Lehre von den Knochenbrüchen, 27 Lieferung der Deutschen Chir., 1886.

- B. Inflammatory processes.
 - a. Pyogenic osteomyelitis.
 - b. Tuberculous osteomyelitis.
 - c. Aneurysms.
 - d. Syphilis.

II. Fractures associated with general diseases.

- A. Neuropathies.
 - a. Tabes dorsalis.
 - b. Syringomyelia.
 - c. Mental diseases.
- B. Senile.
- C. Exhausting chronic diseases.
- D. Atrophy due to non-use.
- E. Scurvy.
- F. Rachitis and osteomalacia.

III. Idiopathic friability of bone (osteoporosis, fragilitas ossium).

Under all of these subjects he gives the recent literature since von Bruns' work, that is, the literature from 1886 to 1904.

Grunert correctly prefers the term "pathologic" to "spontaneous" fracture. Pathological fractures may be due to local changes associated with bone destruction, in which the etiological factor is present in the bone at the site of fracture—*e. g.*, tumors and inflammations; or, the changes may be associated with general diseases.

I. FRACTURES ASSOCIATED WITH LOCAL LESIONS OF THE BONE.

A. *Tumors.* The most common is the primary sarcoma. Pathological fracture associated with metastatic sarcoma is rare. He has been able to find but two cases in the literature—Dalzell, a fracture of the femur due to a metastatic nodule from a sarcoma of the diaphragm; in this case there were also metastatic foci in the skull,¹ and Le Grand, who reports a fracture of the humerus in which the primary tumor was situated in the sciatic notch of the iliac bone.² Unfortunately, he does not give any details of these two cases, and it will be interesting to look up the original to find out the character of the tumor. (Sarcoma rarely metastasizes to bone, no matter what its primary seat. This, of course, may be due to the fact that metastatic sarcoma kills quickly and there may not be time enough for foci in the medullary cavity to grow sufficiently to produce a fracture.)

In primary sarcoma the pathological fracture may be the first symptom. After the fracture union very seldom takes place. Gurlt recorded no instances, von Bruns found four cases in the literature, Grunert was able

¹ Glasgow Medical Journal, April, 1887, vol. xxvii. 4, p. 298.

² Bull. de la Soc. anat., July, 1889, S. iii., 20, p. 470.

to collect 3 more cases, so there are 7 cases of pathological fractures due to primary sarcoma in which union took place after the fracture; 1 case is reported by Verneuil in which the patient lived one year after the first pathological fracture; there was union and shortly before death a second fracture in the same position. Despres¹ records 2 cases, a fracture of the femur, primary sarcoma in sacrum, there was union and the patient lived a year; in the second case, also of the femur, after union there was a second pathological fracture; in both of these cases the autopsy confirmed the diagnosis.

Grunert was unable to find any recorded cases of union after a pathological fracture due to a metastatic carcinoma.

He mentions the possibility of a general friability of bone in patients suffering with cancer cachexia. Such a pathological fracture, according to Grunert, must be considered due to a general disease, which has been called *osteomalacia carcinomatosa*. Von Bruns records 3 cases, Grunert finds 1 reported by Ritchie. This case is of great interest. The patient was a female, aged forty-seven years. In 1885 a complete operation was performed on one of her breasts for a scirrhus carcinoma. In 1892, six years and eight months later, the patient complained of pain in the back and limbs. These continued off and on, and by 1894, in two years, there were definite changes on the pelvis and thorax characteristic of *osteomalacia*. At the autopsy a pathological fracture of the fourth rib was found. The rib showed the characteristic changes of *osteomalacia*, but it is very important to note that cancer cells were found in the soft medullary tissue of the rib. Grunert makes no mention of autopsies in the cases reported by von Bruns, but in this case of Ritchie the *osteomalacic* changes were associated with and, perhaps, due to the presence of metastatic cancer cells in the medullary cavity. In the study of the ultimate results of the cases of cancer of the breast, in the Johns Hopkins Hospital Surgical Clinic, persistent vague pains in the spine and limbs have quite frequently been the first symptoms of a late regional recurrence. I am quite convinced that general medullary bone metastases which do not produce a pathological fracture are quite frequently present in cases suffering with metastatic carcinoma, and they can easily explain the discomforts and sometimes the intense pain referred to one or more different bones.

Grunert refers to the fact that pathological fractures are usually observed with the primary medullary sarcoma. Of the collected cases the fracture was situated in the femur in 56 per cent., in the humerus in 21 per cent., in the tibia in 14 per cent. Of metastatic carcinoma the majority of recorded cases of fracture have been associated with primary

¹ Quoted by Picque.

carcinoma of the breast (60 per cent.), and of all metastatic carcinoma fractures over 50 per cent. have been observed in the femur. I do not think these figures demonstrate that the femur is necessarily the bone most frequently attacked, but on account of its weight-bearing function and its anatomy a focus, especially near the neck, where the pathological fracture is most common, will more easily and quickly produce bone destruction. Grunert was able to find but 1 case of pathological fracture of the humerus due to a metastatic carcinoma; von Bruns found no cases. We have observed 1 among our cancer of the breast cases, while at the same time we have had at least 6 in the femur. In recent literature Grunert found two pathological fractures of the ribs, one metastatic from carcinoma of the œsophagus, and the other from the breast—Ritchie's case, already mentioned.

Bone Metastasis from Thyroid Tumors. This is an unusually interesting condition. Grunert's literature is pretty complete. He mentions 1 interesting case reported by Middeldorpf. The patient was a female, aged fifty-six years; for a year and a half she has had a tumor in the left pelvis in the sacroiliac region and one in the back of the head; as they were soft and boggy a clinical diagnosis of tuberculosis was made; at the exploratory incision the tumor tissue was so vascular that no attempt was made at excision; microscopically the tumor was composed of tissue resembling a colloid adenoma of the thyroid, and at a more careful examination a pigeon-egg-sized tumor was discovered in one of the lobes of the thyroid; later this patient developed pathological fractures in both humeri, and it is interesting to note that both of the fractures healed. The patient lived a year and a half after operation. The duration of life from the onset of the metastatic tumor in the pelvis was three years. Apparently this is the only form of pathological fracture due to a metastatic epithelial tumor in which bony union has been observed.

In this connection Grunert discussed the relation between the thyroid and the osseous system. Von Eiselsberg, now Professor of Surgery in Vienna, in 1893 recorded 8 cases of bone metastasis from thyroid tumors; von Recklinghausen, in an autopsy on a case of exophthalmic goitre, observed definite softening of all the bones, but no fractures. No bone changes have been observed in myxoedema. Hofmeister, in a series of animal experiments, demonstrated great interference with the growth of bone in thyroidectomized young animals, while Steinlin demonstrated on animals that a fracture would not heal if the thyroid had been completely removed, while Pascal found that thyroid extract aided bony union in cases of delayed union after traumatic fracture.

Pathological Fractures with Benign Bone Tumors. Grunert mentions the rare cases of pathological fracture with solid enchondroma. Gross

recorded 5 cases.¹ In recent literature Grunert has been unable to find any other cases. However, in the benign bone cysts, which have previously been discussed in full in *PROGRESSIVE MEDICINE*, a pathological fracture is quite common. Von Bruns recorded 4 cases, and Grunert has been able to add 8 recent observations. Of these 12 benign bone cysts with pathological fractures 10 were situated in the femur, 1 in the tibia, and 1 in the humerus. Grunert does not mention the cases which I have reported with pathological fracture—1 in the humerus and 1 in the femur.

Ziegler mentions the possibility of cysts in arthritis deformans, but no cases of pathological fracture have been observed. I have observed a small cyst in the great trochanter of the femur associated with what might be called osteitis deformans, but in this and Ziegler's cases the shell of bone about the cyst is not only abnormally thick, but hard, and one would not expect a fracture. In the benign bone cysts supposed to be due to the degeneration of a solid enchondroma the shell of bone is thin and friable.

Echinococcus Cysts in Bone are rare. Of all reported cases in only 3.5 per cent. have cysts been observed in the bone. Gurlt in 1862 records 4 cases of pathological fracture. In the next thirty-seven years, up to 1899, Schuchardt, in the *Deutsche Chirurgie*, was able to collect 14 more cases. In the last five years Grunert has been unable to find any further recorded cases. On account of their rarity and interest it is quite probable that such cases would have been recorded if observed.

B. Fractures Associated with Inflammatory Processes. *a. Pyogenic or Infectious Osteomyelitis.* Considering the frequency of this bone lesion pathological fractures are unusually rare, due undoubtedly to the fact that in the acute stage the patient is confined to bed and very quickly, after the onset of the inflammation in the bone-marrow, an ossifying periostitis begins so that by the time a sequestrum has formed, there is a new shell of periosteal bone (the involucrum). Very little has appeared in recent literature since von Bruns' article in 1886. Mauny's report is of interest on account of the rare locality. The patient with an osteomyelitis of the iliac bone died of septicæmia, and at the autopsy a fracture of the acetabulum was demonstrated.

In Habs' surgical clinic in the last ten years there have been 77 cases of osteomyelitis without a fracture.

In the so-called osteoperiostitis aluminosa pathological fractures are also very rare. Poncet records a case in a male, aged forty-five years. This patient from fifteen to twenty-five years of age had recurrent attacks of osteomyelitis, which left him, however, with a leg in good function. He was apparently well from twenty-five to fifty-one years of age, when

¹ Quoted by v. Bruns.

he began to have pain in the old bone lesion, which confined him to bed for a number of days. In getting out of bed and attempting to walk he fell and observed very quickly a swelling of the thigh. This was incised and a slightly hemorrhagic-serous fluid was found which had dissected the periosteum from the shaft of the femur, and a fracture was found. From the wound for some days there was a copious discharge of serum, but it healed slowly with much callus formation, and there was firm union in four months.

b. Tuberculous Osteomyelitis. Pathological fracture in this bone lesion is less frequent than in pyogenic osteomyelitis. Von Bruns finds that they are more common in the short pipe bones and the ribs than in the long pipe bones. In recent literature Grunert was able to find two pathological fractures of the vertebræ, one of the femur through the epiphyseal line and one of the lower jaw demonstrated at autopsy. The latter case was that of a child about two years of age who had multiple tuberculous bone lesions. At the autopsy there was a swelling about the chin due to a collection of pus. This arose from the symphysis of the lower jaw, which was separated. Separation of the epiphysis in pyogenic osteomyelitis is not especially uncommon.¹

c. Aneurysm. Pathological fractures associated with this lesion are due, of course, to the erosion or atrophy of bone due to pressure of the aneurysm sac. They are rare. Cases are recorded in the sternum, ribs and vertebræ. Grunert finds one example of each in the literature. One in a patient, a male, aged thirty-five years, with a history of syphilis, developed a fracture of the thoracic vertebra with paralysis. The autopsy demonstrated an aortic aneurysm opposite the fractured vertebra. In a second patient, a male, aged forty-five years, there were signs of aortic aneurysm for three years. One year before death he complained of intense pain in the chest to the left of the sternum, and there developed in this area a pulsating tumor. At the autopsy in the position of the extrathoracic aneurysmal sac there was found a fracture of the third rib near the sternum.

d. Syphilis. Pathological fractures are relatively rare. The most complete monograph was written in 1884 by Gangolphe. He collected 52 fractures in 39 patients. It is interesting to note that the humerus was the most common seat, yet gumma and periostitis of the humerus are by no means the most common situation. The seat of fracture was as follows: humerus, 18; femur, 12; clavicle, 12; radius, 5; rib, 2; tibia, 1; patella, 1. In recent cases Grunert found: clavicle, 3; tibia, 3; humerus, 4; 1 of the shaft, and 1 of the neck of the femur. Probably the most common situation of syphilitic gumma or periostitis is the rib,

¹ PROGRESSIVE MEDICINE, December, 1899, p. 226.

yet recorded cases of pathological fracture are very rare. This is true also of the tibia. The clavicle is a very common bone for a syphilitic periosteal lesion and apparently pathological fractures are common in this bone. Grunert observed a fracture of the left femur in a male, aged thirty-eight years; the fracture followed a slight trauma while the man was bowling. At the time of the injury there were no signs of tabes, but four years later the patient showed the clinical picture of tabes dorsalis.

This brings up the question of what is the etiological factor of the pathological fracture in lues, whether it is a local lesion due to a gummatous osteomyelitis or a general change in the osseous system. Picque and others advocate the local theory, but they admit that in some cases there are no definite local changes. Charpy has demonstrated that general friability of bone is due to a decrease in lime salts. Grunert calls attention to the fact that the pathological fractures in lues are observed in the very late stages of syphilis, in that period of the disease when gummata are rare, that the age of the patient is usually over forty, that in some of the cases with pathological fracture symptoms of tabes develop. In this latter group of cases fracture is associated with little or no pain; for example, Helferich observed in a patient, aged forty-four years, who had suffered with lues for twenty-four years, a fracture in the lower third of the tibia with great movability which had given the patient no pain whatever. In other cases pain may be a prominent symptom; for example, a male, aged fifty-two years, in attempting to take something out of his right coat inside pocket with his left hand was unable to finish the muscular action on account of pain in the left shoulder; a fracture of the clavicle was found.

II. FRACTURES ASSOCIATED WITH GENERAL DISEASES. *A. Neuropathies.* *a. Tabes Dorsalis.* Of the neuropathies in which pathological fractures are observed those in tabes are most frequent. The first observation is by Charcot in 1873. Kredel in 1888 was able to collect 73 cases, and many more are found in recent literature. The fracture may take place in all stages of the disease; it may be the first symptom, and in some cases one or more years may pass before the clinical picture of posterior sclerosis is established. The trauma may be very slight, pain may be entirely absent, except at the moment of the fracture. Dutil, in 1885, records a case of fracture of the radius in a woman while carrying a basket. She was apparently healthy, later symptoms of tabes developed. Tilmann, in 1896, called attention to torsion fractures of the shaft of the femur produced by the patient attempting to pull his shoe off. In some it was the first symptom of tabes, in others it occurred later in the disease. As a rule the clinical picture of tabes is fully established when the fractures take place. In the majority of cases the

fracture is situated in bones of the lower extremity. In Kredel's statistics the femur was involved 32 times (9 in the neck); tibia, 19 times; fibula, 2 times; humerus, 4 times; both bones of the forearm, 6 times; clavicle, 2; radius and lower jaw, 1 each. In 16 cases the fractures were multiple. In Durand's statistics of 42 cases: femur, 17; tibia, 10; forearm, 6; clavicle, 3; humerus, 2; scapula, pelvis, lower jaw, and radius, 1 each. Undoubtedly, many fractures are overlooked on account of the absence of the pain, particularly the fibula if the tibia is not broken, or the short bones. Since the introduction of the *x*-ray we may expect more observations of the small bones. Schoonheid reports a case of Korteweg in which there were repeated fractures of the patella, in which the knee was resected; later, however, it had to be amputated on account of non-union. Schultz reports a case of Grunmach in which the *x*-ray of a tabetic foot demonstrated a fracture of the scaphoid bone.

The pathological fractures in tabetic patients, as a rule, heal slowly, but union takes place; usually with excessive callus, Charcot's view that union was more rapid has not been confirmed. In the short bone fractures not infrequently union does not take place at all. I am inclined to think this is due to the late recognition and treatment.

b. Syringomyelia. Grunert finds 13 cases in the literature which he gives in brief. The upper extremity is the more common seat. We know that in tabes the joints of the lower extremities are more commonly involved, while in syringomyelia it is usually the joints of the upper extremity. The pathological fractures follow the same rule. Six cases have been observed in the humerus, usually the surgical neck, both bones of the forearm once; ulna, 3; radius, 2; 1 fracture of a small bone, the metacarpus, has been observed; in only three bones of the lower extremity—2 of the femoral neck, 1 of the tibia. The fractures in the cases recorded have been universally transverse; in 2 of the cases of fracture of the surgical neck of the humerus the head of the bone was absorbed. There is seldom pain except at the time of fracture, and that only occasionally. In all but 1 of these 13 cases the symptoms of a disease of the spinal cord were fully developed and easy to recognize. In 1 case a mistaken diagnosis was made, that reported by Gnesda. The patient was a male, aged thirty-five years. While walking he felt pain in the left limb, he fell; with assistance he was able to limp home, but he thought he felt abnormal mobility in the upper part of the left femur; a swelling developed here. Admitted to the clinic at the fourteenth week the tumor was diagnosed sarcoma and an amputation undertaken. The patient died twenty-four hours after operation from a lung embolus. The autopsy demonstrated a fracture with excessive callus. If this case had been studied with an *x*-ray or an exploratory incision had been made, the proper nature of the disease would, of course, have been recognized.

c. Mental Diseases. There is considerable difference of opinion whether there is an increased fragility of bone in mental diseases. In the recent literature there are no pathological fractures reported in multiple sclerosis, progressive muscular atrophy, or hemiplegia. In the so-called progressive paralysis of the insane fractures of the ribs are most frequently observed. Grunert and other authorities view these fractures as traumatic in origin due to rough handling by the attendants. In the insane asylum in Magdeburg between 1893-1903, ten years, among 2359 insane of which 235 were suffering with progressive paralysis, there were no recorded cases of pathological fracture. Neumann also observed in 327 traumatic fractures in the insane union took place as rapidly as in healthy individuals. This, according to Grunert, is a fact against any specific friability of bone, because in tabes and syringomyelia, in which the bone changes leading to fractures are due to definite lesions of the spinal cord, union is usually retarded.

B. Senile Changes of the Bone. Undoubtedly in old age porosis and fragility of the bones is present. Especially is this seen in fractures of the neck of the femur.

C. Exhaustive Chronic Diseases. In any disease associated with emaciation bone changes leading to fragility may take place. Fractures of the rib from slight injuries, like coughing, are frequently observed. Cases have also been observed in diabetes and chronic nephritis. It is difficult to estimate in these general diseases how much of the bone changes are due to the disease itself, or how much to non-use.

D. Atrophy Due to Non-use. Von Bruns has called attention to the fact that the use of the limb and its weight-bearing function are necessary to the preservation of the complicated architecture of the bone lamellæ, especially the arches. When a limb has not been used for some time, no matter what the cause, porosis and fragility of the bone take place. Union, however, in such cases is not usually retarded.

E. Scurvy. This is such a rare disease in recent times that one would naturally expect little in recent literature. Gurlt records 6 cases and von Bruns 4 more. The only recent communication that Grunert was able to find is by Sutherland in 1898, who records 4 interesting observations, all of them in infants, some of them Barlow's disease or infantile scurvy.¹ The fractures may be multiple of any bone. They are always associated with extensive swellings and ecchymoses. The fracture is always associated with extensive stripping of the periosteum from the bone by hemorrhagic exudate. Under proper treatment the child usually recovers and union takes place. In view of the interest I will give Sutherland's cases in detail. Grunert thinks that while Sutherland's first two cases are really scurvy, the latter two may have been rachitic.

¹ See Osler's Text-book.

Sutherland's Cases of Fragility of Bone in Scurvy.

Case I. Male child, aged four and a half months, fed first on milk, later on meat. Three weeks ago the mother noticed that the child cried whenever it moved its right arm. The arm was swollen, discolored, and paralyzed. The swelling appeared first under the right shoulder and then it extended beneath the elbow. Two days later the left arm showed a similar affection, and in rapid succession there were swelling, softness and loss of motion in both femora, tibiæ, and radii with intense pain.

Examination. Anæmic, poorly nourished child. Gums pale, otherwise healthy. No sign of rickets. Femur and tibia swollen, soft, in a condition of complete pseudoparalysis. The child was apathetic, but cried at the slightest touch. The swellings were irregularly distributed over the bone, now on the shaft, now on the epiphyses. Extensive extravasations of blood on the lower arms. The swellings were apparently subperiosteal; all long bones of the extremities were affected. Several bones were fractured; the right humerus in two places, the left humerus, the left radius, the left ulna, both femora. One of the two fractures of the right humerus was at the epiphyseal line, all the other fractures were of the shafts.

Under milk diet, oranges, grape-juice, malt extract, there was rapid disappearance of the pain in four days. One month later the child was able to move all its limbs voluntarily, firm consolidation of bone, though with considerable deformity.

Case II. Male child, aged twelve months. Fed for first five months on mother's breast, then cows' milk diluted in equal parts with oatmeal, then with meat juice.

On admission distinct signs of scurvy; general anæmia with œdema of the lower extremities. The gum around the incisors swollen, infiltrated and œdematous. Subperiosteal swelling and extreme softness of the bones of the lower extremities. Fracture of both humeri in the upper epiphyseal line. Separation of the upper and lower epiphyses of both tibiæ; shaft fracture of the right tibia.

Firm union with slight deformity under proper diet.

Case III. Child, aged over two years. Had been raised on bread, water, and sugar, and was never well. It had not learned to walk, or talk, and cried with pain when placed on its feet.

At the autopsy five fractures were found.

The left femur was examined more carefully; at the epiphysis definite ossification; the marrow cavity very wide and the bone very thin, porous, slightly indented and resembled a shell. In the upper third there was an ununited transverse fracture surrounded by a considerable mass of callus.

Case IV. Male child, aged two years. Fed upon cows' milk diluted with water. Weak, rickety child with many partly united, partly un-united fractures, principally of the long pipe bones. It is distinctly stated that on admission there were no signs of hemorrhage.

F. Rickets and Osteomalacia. Pathological fractures in rickets are so frequent that Grunert has very little to say about them. In osteomalacia it is usually a bending, although fractures are not infrequent. A new relation of osteomalacia to diseases of the thyroid is brought out in a monograph by Hönnicke.¹ In a patient suffering with *exophthalmic goitre* which proved fatal the autopsy demonstrated osteomalacia of the bones. This led Hönnicke to investigate the subject. He claims to have found that osteomalacia occurs only in districts in which there is goitre. He thinks that the changes in the bones are due to hypersecretion of the thyroid, and advocates partial removal of the thyroid gland. These observations must be confirmed, but it impresses me as conflicting with the experimental work which seems to prove that thyroid secretion is essential for osseous union after fracture.

III. IDIOPATHIC OSTEOPATHY. As Grunert has been able to find only a few new cases since Griffith's publication in 1898,² he has nothing to add to Griffith's conclusions. There are two recent contributions to this subject not discussed by Grunert; one by Gloye³ and one by Döring.⁴

BENIGN AND MALIGNANT TUMORS OF THE EXTREMITIES.

This subject was introduced in 1899.⁵ At that time I discussed only bone tumors and emphasized the relatively different grades of malignancy which should be recognized in the extent of the operative treatment. In 1902⁶ the subject of bone tumors was again taken up along the same lines, and for the first time I mentioned benign bone cysts, with consideration chiefly of König's⁷ article. In 1903 all varieties of tumors, except the epithelial, were extensively described in regard to their clinical and gross pathological diagnosis, and the operative treatment based upon their relative malignancy. For convenience they were classified into the following groups: benign connective-tissue tumors and sarcoma, or malignant connective-tissue tumors. The latter were classified into sarcoma of the skin, of the soft parts, and of bone. The next group, the

¹ Monograph, Karl Marhold, Halle a. d. S.

² American Journal of the Medical Sciences, vol. cxiii. p. 426.

³ Inaugural Dis., Kiel, 1904; reviewed in Centralbl. f. Chir., 1905, vol. xxxii. p. 660.

⁴ Deutsche Zeitschr. f. Chir., 1905, vol. lxxvii. p. 284.

⁵ PROGRESSIVE MEDICINE, December, p. 234.

⁶ Ibid., pp. 150-166.

⁷ Ibid., pp. 147-204.

epithelial tumors, were fully discussed in 1904.¹ At the same time discussion of the previous groups was continued.² In this contribution to the subject of tumors I not only considered the literature, but drew largely for facts and illustrations upon the material of the surgical pathological laboratory of Dr. Halsted's clinic, of which I have charge. In this discussion, in order to better illustrate the classification, I was compelled to bring in tumors situated in regions other than the extremities. Having now established a working classification, I shall hereafter confine my discussion to tumors arising in the skin, soft parts, and bones of the extremities.

The importance of a knowledge of pathology and a better classification of tumors is emphasized in the oration on surgery by J. Collins Warren,³ of Boston.

I had prepared a paper to read before the American Surgical Association in San Francisco this year on the "Treatment of Tumors Based on Their Relative Malignancy and the Prognosis of the Various Pathological Varieties."⁴

In the discussion of Warren's paper a great deal of stress was laid upon the importance of *frozen sections*. In my own experience, during the last ten years, we have employed frozen sections constantly, but I do not remember a single instance in which, if there was any doubt as to the diagnosis from the naked-eye appearance of the diseased tissue exposed at the operation, the frozen sections could be relied upon.

The entire object of the study and teaching of surgical pathology is to so familiarize ourselves with the clinical picture and naked-eye appearances of certain lesions that the diagnosis can be made without the aid of the microscope. The microscope confirms the diagnosis and aids in the expert training.

As in the past, so in the future, contributions to this periodical I shall attempt, in the study of tumors, first, to illustrate the clinical picture and the naked-eye appearances in such a way that improvement can be accomplished in diagnosis; second, to demonstrate the importance of restricting or extending the operative interference according to the nature of the disease and its relative grade of malignancy.

Benign Connective-tissue Tumors. Under this heading we are interested in selecting those forms of congenital and acquired moles and *nævi* which

¹ PROGRESSIVE MEDICINE, pp. 134-174.

² Ibid., pp. 174-190.

³ The Surgeon and the Pathologist. A Plea for Reciprocity as Illustrated by the Consideration of the Classification and Treatment of Benign Tumors of the Breast. Oration in Surgery at the Fifty-sixth Annual Session of the American Medical Association, Portland, Oregon, July 11-14, 1905. The Journal of the American Medical Association, July 15, 1905, vol. xlv. p. 149.

⁴ If this paper is not published in the Transactions of 1905, it will appear in the Transactions for 1906. I was unable to be present to read my paper this year.

have a tendency later in life to become sarcoma.¹ The various forms of fibroma of the skin and the cicatricial keloid are of great practical importance, because of their tendency to become sarcoma.² In the possible tumors of the extremities between the skin and bone we must bear in mind the various forms of fibroma, lipoma, and the rare and interesting fibromyxoma of nerve sheaths. The muscle lesions are frequently difficult to recognize clinically from sarcoma. Myositis we have considered in great detail.³

Intermuscular Hæmangioma. I mentioned this subject briefly in 1903,⁴ discussing the contributions of Stauch and Honsell, which appeared in 1902, and reporting briefly three cases from Dr. Halsted's clinic. These three patients, in whom the angiomata were situated in the thigh, forearm, and calf, are free from recurrence to-day, six and thirteen years since operation. The function of the limb is unimpaired.

I find three recent contributions to this subject by Riethus,⁵ Keller,⁶ and Sutter.⁷ According to the most recent contribution of Sutter, who refers to the others, there are now 40 cases, to which he adds 5, of primary hæmangioma of the muscle. The disease is more frequently observed in the young. Trauma is a frequent etiological factor. The involvement of muscles is somewhat in the following order: thigh, usually the quadriceps, 14 cases; forearm, 8 cases; muscles of neck, calf of the leg, and back, each 4 cases; upper arm and ball of the thumb, each 2 cases; muscles of the foot, chest, and masseter muscle, 1 case each. As to the exact etiology it is yet unsettled. There may be a congenital tumor, but traumatism and the action of the voluntary muscles apparently play an important part. We must distinguish a primary angioma of the muscle from the angioma which begins in the skin, subcutaneous tissue, and secondarily involves the muscle—a more common variety. As in angioma of all tissues, so in the muscle, the vascular tissue may be circumscribed or diffuse, and it differs according to the size of the vessels; it may, therefore, be classified into capillary, cavernous, and telangiectatic. Clinically, the tumor, as a rule, is of slow formation—many years; in a few of rapid growth—a few months. The characteristic symptoms—compressibility, change in size—are not always present, especially in the circumscribed form, and for this reason a clinical diagnosis is not always possible until the muscle is exposed by open incision. The tendency of this form of angioma to become malignant must be unique. No positive cases have

¹ PROGRESSIVE MEDICINE, December, 1903, p. 149; *Ibid.*, December, 1904, p. 147.

² *Ibid.*, December, 1903, p. 158, and 1904, p. 178.

³ *Ibid.*, December, 1903, pp. 174-185.

⁴ *Ibid.*, p. 184.

⁵ Beiträge zur klin. Chir., 1904, vol. xlii, p. 454.

⁶ Deutsche Zeitschr. f. Chir., 1904, vol. lxiv, p. 574.

⁷ *Ibid.*, 1905, vol. lxxvi, p. 368.

been observed. Histologically, in some of the cases mentioned by Riethus and Sutter, the presence of round and spindle cells in the stroma might suggest a malignant change. In most of these tumors the blood spaces are lined by endothelium, and in the wall of this space smooth muscle fibres are found. The stroma is usually a loose connective tissue, very much like the adventitia of the wall of the vessel, and, in addition, one finds many islands of fat. The surrounding muscle shows all stages of pressure atrophy, and in some tumors, usually the circumscribed, the striated muscle bundles may have completely disappeared. According to Sutter, the fat can be explained not as a special element of the new formation, but simply as a tissue replacing the destroyed muscle. It is a fact well known in pathology that when a highly specialized tissue is destroyed it is usually replaced by adipose tissue. As mentioned before, in some cases, one will find in the stroma areas of round and spindle cells which histologically suggest a sarcoma. As a matter of fact, this is not an uncommon finding in many vascular and even non-vascular benign connective-tissue tumors. It is a finding which frequently confuses even the expert when he attempts to base the diagnosis of a tumor on a histological examination only. Among these cases are primary hæmangioma of muscle, none have been reported which resemble the elephantoid hæmangioma or the fibroangioma, which I discussed in *PROGRESSIVE MEDICINE* for December, 1903, p. 154. One of these cases involved the tendon sheaths of the ankle, but not the muscle; the second involved the muscles of the ball of the thumb; the third was a subcutaneous tumor in the elbow-joint. Since then I have observed a fourth case—a subcutaneous tumor near the ankle.¹ I mention these four cases here because the histological picture very closely resembled a sarcoma, yet clinically they were benign, the naked-eye appearance demonstrated that they were chiefly angioma, and the ultimate results, as the tumors were not completely removed, is a positive indication of their innocent character.

Of the forty-five cases now in the literature I will discuss in detail only one, and this because amputation was performed, it seems to me, unnecessarily. The case was reported by Riethus. The patient, a girl aged fourteen years, gave a history of trauma ten years before she came to the clinic, when she slipped and sprained the left ankle. There was no immediate disability. A few weeks later she noticed a swelling in the calf above the ankle. Within a year the swelling increased somewhat and the child limped, because it was painful to walk properly on the foot. Even at this time change in size and swelling was observed. During the next nine years there was no increase of the symptoms. However,

¹ *International Clinics*, April, 1904, vol. i., fourteenth series, p. 240.

a few weeks before she came to the clinic, pain, weakness in the limb, and limp increased. At the examination there was a diffuse swelling, which began on each side of the tendo Achillis and extended up to the junction of the middle and upper third of the calf; the skin was normal; the tumor was doughy and slightly compressible; the superficial veins were not dilated, except over the inner malleolus. The clinical diagnosis was not made. At the exploratory incision, perpendicular from the popliteal space almost to the heel, nothing abnormal was found until the aponeurosis of the muscles was exposed. This fascial membrane was dark blue in color, and on incising it the muscles were ramified with blood-containing, thin-walled vessels; the angioma was present in most

FIG. 25



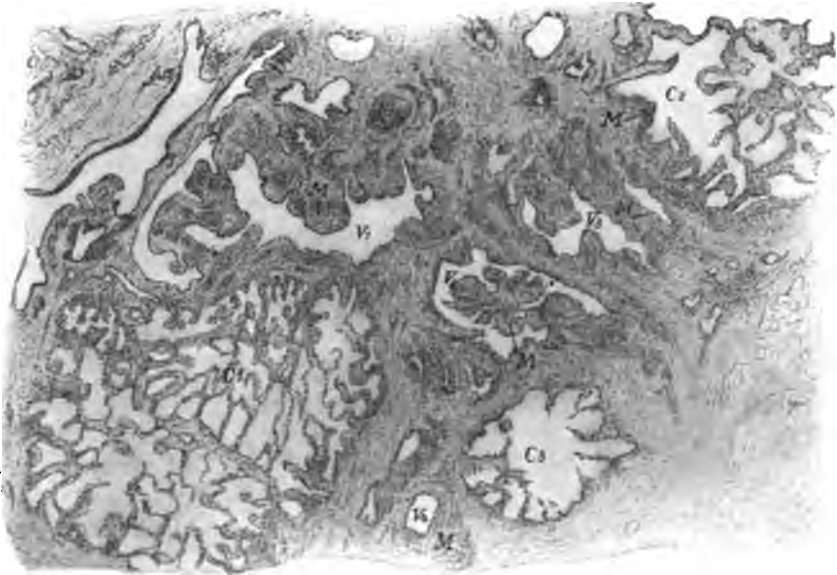
of the muscles of the calf; a V-shaped piece was excised without injury to tendons or nerves; the hemorrhage was only moderate and easily controlled by muscle suture. The wound healed per primam. The patient returned in eight months without evidence of improvement. At the second operation the leg was amputated. At the exploratory incision preliminary to amputation it was observed that the posterior tibial nerve was encased in angiomatous tissue. Riethus considered that this explained the intense pain and the inability to walk with the foot flat on the ground. The angiomatous tissue did not extend to the popliteal nerve. Fig. 25 is a sagittal section of the amputated limb; the dark areas represent the extent of the angioma. Fig. 26 will illustrate the histological finding, although this is a section from another case.

Sutter records only one other case of amputation. I am quite positive that the extent of the angioma in Riethus' case was no greater than one

observed in Dr. Halsted's clinic, involving all the muscles of the calf of the leg, which was completely cured by a more extensive excision of muscle, and I am impressed that in Riethus' patient a second more extensive muscle excision should have been attempted. It is not necessary to remove all of the angioma in these cases, because the scar tissue of the healing process, as a rule, effects a cure, or at least prevents further trouble.

MYOSITIS. I find little to add to my previous discussion¹ on inflammations and tumors of the muscle, except the above, on intermuscular angioma.

FIG. 26



Acute purulent myositis is a rare lesion. Observations in which the pneumococcus is the source of the infection are unique. Pätzold² has had one interesting observation, and finds only two others in the literature. The case was apparently a cryptogenic infection, with the formation of abscesses in the biceps, latissimus dorsi, and gluteus. In addition to an abscess cavity due to the myositis there were muscle sequestra, a very unusual finding. The patient was a male, aged seventeen years, who had had fever for fourteen days; on admission there was an inflammatory tumor over the biceps and one over the lower angle of the scapula. A clinical diagnosis of osteomyelitis was made, but at the

¹ PROGRESSIVE MEDICINE, December, 1903, pp. 177-185.

² Beiträge zur klin. Chir., 1904, vol. xliii. p. 668.

exploratory incision the true nature of the lesion was demonstrated. Later a third abscess formed and was opened in the gluteus muscle. The patient recovered. Cultures demonstrated the presence of the pneumococcus. One interested in the bacteriology of the pneumococcus will find a most interesting study in the recent number of the *Journal of Experimental Medicine*, August, 1905, vol. vii., No. 5.

MYOSITIS OSSIFICANS. I find a number of interesting communications in recent literature in which, however, there is little to add to our previous discussion. Nadler's¹ communication is of interest because the ossifying areas in the muscles about the lower end of the humerus entirely disappeared. In Frank's article,² with the report of two cases, there is an interesting discussion of the literature, practically all of which I have previously considered. Bode,³ in reporting 4 cases, considers the question of traumatic origin chiefly, and calls the lesion contusion exostosis of the femoral bone. The different views as to the etiology of the bone in the muscle, whether it originates in the tissue between the muscle, or from detached pieces of periosteum, has been discussed. For practical purposes it makes very little difference. The diagnosis is made positive by the *x*-ray. Operation is not indicated at once, because there appears to be a tendency to spontaneous recovery.

However, when the formation of bone continues, associated with pain and some loss of function, excision is indicated. At the operation one should never hesitate to leave bone if its complete removal would jeopardize muscle function or neighboring nerves or vessels. After the operation there is usually some reformation of bone. It soon ceases, then gradually disappears, not always completely. The results of treatment are uniformly good. These remarks are again confirmed by the contribution of Cahier,⁴ who considers 134 cases from the literature, 64 involving the muscles of the upper arm, 74 in the thigh, and 6 of miscellaneous muscles. He also brings out a new point in treatment which is to be considered only in the early stage of the disease. Myositis ossificans has a distinct relation to a single or repeated trauma; bone may form within a month after the primary single trauma. During this formative period operation is contraindicated; one must wait, if possible, until bone formation ceases, which can usually be recognized in the *x*-ray. Then operation is indicated as discussed above. Cahier reports cases which have been cured by massage.

¹ Deutsche Zeitschr. f. Chir., 1904, vol. lxxiv. p. 427.

² Archiv f. klin. Chir., 1905, vol. lxxvi. p. 883.

³ Deutsche Zeitschr. f. Chir., 1905, vol. lxxviii. p. 546.

⁴ Revue de chir., vol. xxiv., Nos. 3-6; reviewed in Centralbl. f. Chir., 1905, vol. xxxii. p. 142.

Tumors of Nerves. The classification of Virchow into true and false neuromata still holds good. In true neuromata the tumor is composed of nerve fibres, medullated or non-medullated, or of ganglion cells. These are rare tumors. The false neuromata are tumors which arise from the connective tissue of the sheaths of the nerves. They are either fibroma or myxoma. The entire tumor may be only attached to the sheath of the large nerves; this is the most common situation; or it may arise from the connective tissue between the nerve filaments, and so, in its growth, separate the nerve fibres. To completely remove the latter tumor the nerve must be sacrificed, while the enucleation of the former is accomplished without injury to the nerve. True ganglia of the nerves (*neuroma ganglionare verum*) are rare tumors. In an article by Borst¹ I find excellent histological illustrations of these tumors. Kredel and Beneke² have given us a most interesting contribution, with illustrations, on *ganglioneuromata* and other tumors of the peripheral nervous system. One of their cases was a multiple subcutaneous neuroma in a child aged five years. The tumors contained ganglion cells. In the literature they were able to find reports of two solitary tumors of this character; one clinically and histologically benign, the other histologically malignant and associated with metastases; and a third case in which the tumors were multiple, as in their own observation. Fig. 27 illustrates the multiple tumors in the young child. Clinically, it could not have been differentiated from von Recklinghausen's disease—multiple fibroma molluscum.

FIG. 27



A *ganglion* is a term used in two senses: first, for a cystic tumor in connection with tendon sheaths, bursa, or synovial sac in the joint; or for a part of the nervous system containing typical cells. Custodius³ describes a most interesting and unique case in which the tumor involving the peroneus nerve near the upper end of the fibula was not a *ganglioneuroma*, but a true connective tissue ganglion; that is, a cyst due to the myxomatous

¹ Die Lehre von den Geschwülsten, J. F. Bergmann, Wiesbaden, 1902.

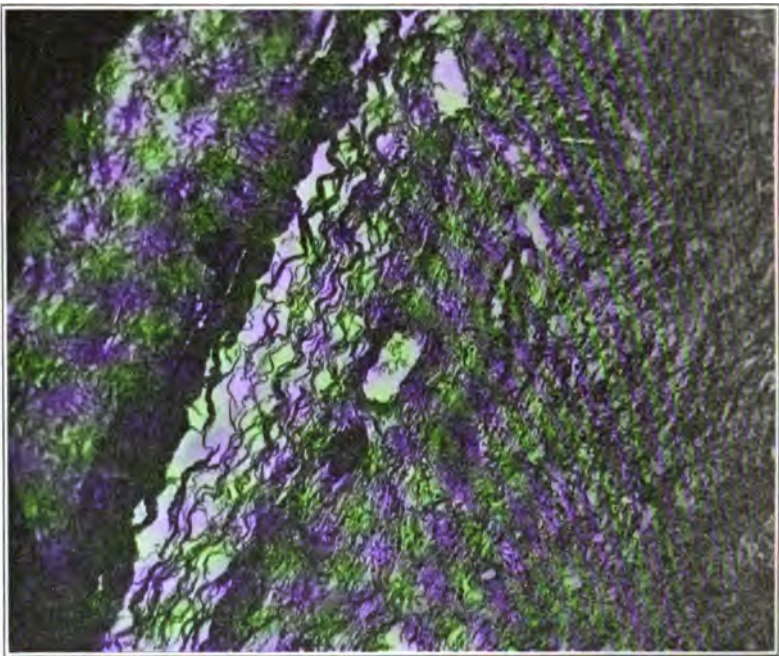
² Deutsche Zeitschr. f. Chir., 1902, vol. lxxvii. p. 239.

³ Beiträge zur klin. Chir., 1904, vol. xliii. p. 788.

degeneration of the connective-tissue elements of the false neuroma, or the fibromyxoma of the nerve.

He brings out a new etiological factor as to the formation of the connective-tissue ganglion, with which I was not familiar. Billroth and others have described ganglion as hernial protrusions of the synovial-lined tendon sheath, joint capsule, or bursa. The connection with the original cavity may later be closed off. Custodius, however, considers Ledderhose's view, who describes ganglion as originally a solid connective-tissue tumor in which myxomatous degeneration takes place in focal areas with the formation of multiple cysts, which later may coalesce

FIG. 28



and form a single cavity. Custodius' tumor of the peroneus nerve was of this character. It was of further interest because it belonged to that variety of fibromyxoma of the nerve in which the tumor arose within the sheath and in its growth separated the nerve fibres. There was a central cavity filled with fluid myxomatous substance. The thick portion of the wall of the cavity contained nerve fibres which had degenerated; while the thin half of the wall contained no nerve fibres. Clinically, the patient, a male aged twenty-nine years, observed, a year before he came to the clinic, as a symptom of onset weakness of the muscles supplied by this nerve and sensory disturbances. At the examination in the clinic,

PLATE I.



Sarcoma of the groin.

in addition to sensory and motor paralysis, a tumor not observed by the patient could be palpated posteriorly below the head of the fibula. At the operation it was necessary to resect the nerve in order to remove the tumor.

Plate I. is a beautiful colored painting by Miss Hayes of a fresh fibromyxoma removed by Dr. Finney from the sheath of the nerve in the groin. The tumor has been cut open and the painting illustrates the capsule and the typical naked-eye appearance. At one point the tumor had broken beyond the capsule and was extending along the sheath of the nerve. The patient was a white male aged twenty-two years; the tumor had been observed in the groin two years; there were no other symptoms except tumor. It was freely movable and encapsulated. The histological appearance of the tumor is shown in Fig. 28.

The experience of the surgical clinic in this form of tumor, twelve cases, I have previously discussed.¹ Practically all of these patients I have been able to trace; in none have the tumors recurred. This is the second observation of a tumor of this character in the groin. The other case has remained well seven years.

Lymphangioma and Lymph Cysts. In my previous discussion I was interested chiefly in my own experience and the literature on the relation of lymphangioma of the skin (congenital and acquired mole) to sarcoma.² I have not discussed, however, elephantiasis, nor, until this year, was my attention directed to the very important and unique lymph cysts of the thigh.

LYMPH CYSTS OF THE THIGH. In March, 1903, two and a half years ago, Dr. J. F. Mitchell, of Washington, sent to the surgical pathological laboratory a large cyst which he removed from the thigh of a woman aged fifty-four years. The cyst was present on the anterior surface of the thigh and extended from Poupart's ligament to the middle third; it contained cloudy fluid. The wall was about 3 to 5 mm. in thickness, and the entire cyst was easily removed by enucleation. Sections made at that time by Dr. Haskell showed tuberculosis. Unfortunately, I am unable to find the pathological note made at that time and the sections of the original tissue. Dr. Mitchell writes me that four months after this operation the patient developed a tuberculous ankle on the opposite side, since which time he has been unable to trace the patient. This case undoubtedly will be reported later in detail by Dr. Mitchell. I am quite convinced that even from our incomplete data we are justified in the diagnosis of tuberculous lymphatic cysts of the thigh.

In November, 1904, a colored woman was admitted to the surgical clinic of the Johns Hopkins Hospital with a cystic tumor on the inner

¹ *PROGRESSIVE MEDICINE*, December, 1903, p. 172.

² *Ibid.*, December, 1903, pp. 149 and 166; December, 1904, pp. 174 and 177.

side of the thigh above the knee and a second similar tumor in the groin. The patient was operated on by Dr. Baer and the two cystic tumors removed, which proved to be lymphatic cysts. The microscopic study of the walls of these cysts demonstrated that a malignant change had taken place, and histologically we have a definite endothelial sarcoma in the walls of these cysts.

It is this observation that led me to the investigation of the literature on this very interesting and rare lesion. I was able to find articles by Narath,¹ Strehl,² and Nordmann.³

The cases reported by these authorities are of such interest that I feel justified in reporting them in detail.

These so-called lymphatic cysts of the thigh may be due to congenital or acquired, closed-off pouches of peritoneum, usually present in the situation of a femoral hernia; or, they may be due to the sac of a gravitation abscess from tuberculosis of bone in the pelvis or vertebræ. The bone lesion heals, the typical pus of the tuberculous abscess becomes absorbed, and is replaced by a clear or cloudy fluid. In other cases the cyst is due to an injury of a lymphatic vessel, after which the extravasated lymph becomes encysted (Nordmann).

Nordmann's Case. Cystoma lymphaticum fasciale.

Clinical History. Negative, except for trauma and pregnancy. Onset seven years ago. The patient was in the last month of her first pregnancy when she fell on the right buttock, after which there was local pain. After the birth of the child the placenta was retained and had to be removed. No other complications. The local pain continued and she received treatment for it, but it did not interfere with function of the limb. One year after the injury she first noticed a swelling in the region of the right buttock. This swelling in the following six years had gradually extended from the trochanter to the popliteal space. During this time two children had been born without complications. She sought advice at the clinic because of the size and discomfort of the tumor.

Examination. Occupying the posterior surface of the right thigh there was a swelling extending from trochanter to popliteal space. The skin was normal, except for a few dilated veins. The tumor beneath the skin felt tense, smooth, elastic, in places it fluctuated; it was movable on the skin and deeper tissues. There was no impaired muscular function or sensation; no œdema of the limb; no pain.

Clinical Diagnosis. Lipoma or cyst, probably the former, since the latter is extremely rare.

¹ Archiv f. klin. Chir., vol. I. p. 763.

² Deutsche Zeitschr. f. Chir., 1899, vol. li. p. 178.

³ Ibid., 1901, vol. lx. p. 572.

Operation. On incision the skin and subcutaneous fat were found normal. After dividing these a smooth, tense, bluish membrane was exposed. There was no difficulty in enucleating this wall from the subcutaneous fat and muscle. It did not extend between the muscles, but the fascia lata must have been part of the wall, because, after the cyst was enucleated, the muscles were naked. The cyst was attached to the trochanter by a fascial band, which was divided. No vessels required ligature.

Gross Pathology. A single cyst 21 by 11 cm.; the wall was 2.5 mm. thick. To the outer surface there were attached some muscle and fat. The inner surface was, as a rule, smooth. There were a few elevated membranous septa and some round elevated spots, which Nordmann calls excrescences. With the naked eye stratification could be seen in the wall. The cyst contained a lemon-colored, clear fluid, of alkaline reaction, coagulating on boiling. Cholesterin crystals floated in this fluid.

Microscopic Pathology. The cyst wall was composed of layers of loose and compact fibrous connective tissue, containing here and there in large and small groups round and spindle cells. The lining of the wall was composed of one or more layers of endothelial cells. In some places the endothelial lining was lost. The contents showed fat drops, round and spindle cells, and cholesterin crystals.

Nordmann considers that at the trauma some years ago a large lymphatic trunk in the fascia lata was torn; lymph slowly extravasated into the connective tissue and, as it accumulated more rapidly than it could be absorbed, the connective tissue about the fluid organized, allowed less absorption, and, since the communication with the lymphatic system was not closed, the accumulation of lymph gradually enlarged the cavity, which became lined with endothelial cells. In support of this view, in addition to the histological examination, there was, after operation, an accumulation of lymph in the wound. This was observed on the tenth day. Nordmann thinks if he had ligated the fascial pedicle to the trochanter he might have closed the lymphatic vessel. As the patient refused a secondary operation, he injected into the cavity, first, iodine, then silver nitrate, without effect; then a 10 per cent. solution of chloride of zinc. This irritant produced necrosis and led to secondary infection, demanding a reopening of the wound. The granulation tissue thrown out closed the leaking lymph vessel, and the wound healed by granulation.

In the examination of the literature up to 1901 Nordmann was unable to find a case in the same situation. The cases of Michel and Velpeau, as well as that of Narath, were situated on the inner surface of the thigh. Morel-Lavallee collected 13 cases of cysts due to lymph extravasation, 5 of which were situated on the thigh.

Nordmann wrote me in November, 1904, that at the examination of this patient, made a few days previous, the patient was perfectly well and there was no evidence of recurrence.

*Narath's Case.*¹ The patient was a girl aged twenty-two years. In the anterior and outer portion of the right thigh she observed a tumor two years ago, which had gradually reached its present size, of a man's fist, without pain. The patient had observed that the tumor was soft and compressible. There had been no other symptoms.

The examination was negative, except for the tumor. This was situated beneath the skin in Scarpa's triangle between the adductor and extensor muscles of the thigh. The skin was freely movable; the tumor was fixed on the deeper tissues; it was compressible and got smaller, but on coughing filled again. It was not noted whether it could be felt above Poupart's ligament in the iliac fossa when compressed, but Narath could feel a cord the size of two fingers extending from the tumor beneath Poupart's.

Clinical Diagnosis. On account of the absence of any signs of tuberculosis of the vertebræ or pelvis an abscess was excluded. The possibility of a femoral hernia was considered.

Operation. In removing the cyst the operation was an extensive and difficult one. The cyst wall was very adherent to the fascia over the muscles. It extended beneath Poupart's ligament and communicated with a second sac between the peritoneum and the iliopsoas fascia, and this sac extended to the transverse process of the lumbar vertebræ. The communicating sac passed beneath Poupart's ligament to the outer side of the femoral artery.

In making the dissection three skin incisions were necessary—groin, iliac fossa, and lumbar region. The profunda femoral and circumflexa iliac arteries and vein were ligated.

In five weeks the patient was discharged, with two small sinuses.

Gross Pathology. The cyst was single, with septa. The wall varied from 0.5 to 2.5 mm. in thickness. The outer surface was ragged; the inner smooth only in places; in others velvety; there were many nodular growths from inner wall, some cords passing from one wall to the other; some had but one attachment.

Microscopic Pathology. Granulation tissue; outer wall fibrous, inner cellular; in places there was a distinct, irregular, endothelial lining. The tissue projecting from the inner wall described in the gross as nodules and cords was necrotic and took the stain very faintly. At the base of this necrotic tissue there were foreign-body giant cells and spaces, which apparently contained cholesterol crystals.

¹ Quoted from Strehl, loc. cit

Contents of the Cyst. One litre of opaque fluid, which coagulated on boiling. The microscope showed cholesterin crystals, leukocytes, fat drops, granular cells, endothelial cells.

Strehl's Case. Retroperitoneal tuberculous cyst. Male, aged twenty years. Seventeen months before admission the patient fell on the right knee and was treated five months for traumatic arthritis, which resulted in a knee somewhat fixed at a right angle. While under treatment he observed in the left groin a painless swelling, which grew slowly. The patient sought the advice of the clinic for his ankylosed knee, which was treated with extension, and recovered.

The tumor shown in the diagram corresponded pretty closely with that in Narath's case. The skin was normal, the tumor fixed between the adductor and extensor muscles in Scarpa's triangle, the size of a fist, with a pedicle extending beneath Poupart's ligament; it was compressible, reappearing on pressure in the iliac fossa, grew smaller when the patient was lying down, reappeared when he was standing or coughed; there was fluctuation, dulness on percussion, but no pain or tenderness. There was no evidence of tuberculosis of the pelvis or vertebræ; tuberculin was not given (Fig. 29).

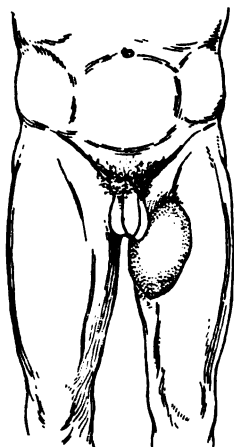
Clinical Diagnosis. Having just read Narath's case, Strehl found the similarity so striking that the diagnosis of a retroperitoneal lymph cyst was made. However, von Eiselsberg did not feel that such an extensive operation was justifiable. For this reason only an exploratory incision was made, the contents evacuated, the sac filled with an emulsion of iodoform and glycerin, and the wound closed. The result was not as satisfactory as in Narath's case. At the time of the report of the case the patient had a fistula..

Gross Pathology. The cyst contained about one litre of a yellow serous fluid. The wall of the cyst corresponded with Narath's description; the outer surface was adherent, the inner smooth; or polypoid excrescences, one cord. The sac entered the pelvis to the outer side of the vessel and was sounded as far as the kidney.

Microscopic Pathology. The sections from an excised piece of wall showed two pictures; one similar to that in Narath's case, the other coagulation necrosis on the surface of the wall, and beneath typical tuberculous granulation tissue and typical tubercles.

The microscopic findings in Strehl's case incline him to the view that these retroperitoneal lymph cysts are tuberculous gravitation abscesses

FIG. 29



in which the contents become serous. The microscopic examination of the contents of the cyst in Strehl's case was similar to that in Narath's case.

Strehl, like Narath, was unable to get the original publications of other retroperitoneal lymph cysts. In December, 1904, Dr. Strehl wrote me that the patient died a few years after operation with symptoms of tuberculosis.

Baer's Case. Pathological No. 5866. Multiple lymph cysts near the knee, groin, and iliac fossa. Malignant endothelium in wall of cysts. Death later from recurrence in abdomen.

The patient was a colored female aged thirty-four years; married; no children. As far as we could ascertain, the family and personal history were negative. The only etiological factor was an infection of the toe of the right foot six months before she came to the clinic. The signs of inflammation disappeared in about one week. Six weeks later the patient observed the swelling on the inner side of the knee and about ten days after this the swelling in the groin. Recently both had increased more rapidly in size and the tumor in the groin had been painful. There has also been pain in the back. At the examination there was a globular swelling 8 by 10 cm. on the inner side of the lower end of the femur extending from the patella to the popliteal space, and a second similar tumor in the right groin, with slight fulness in the right iliac fossa. The skin over the swelling was normal; the tumors fluctuated. On bimanual palpation fluctuation could be obtained between the swelling above and below Poupart's ligament. A clinical diagnosis of tuberculous abscess was made. At the operation on October 31, 1904, by Dr. Baer, the popliteal tumor was first aspirated; it contained a blood-stained fluid, in which, with the microscope, numerous large cells were found. The tumor below Poupart's ligament was first attacked; it was a thin-walled cyst the size of a hen's egg, and contained a reddish-brown fluid with granular particles and loose soft bodies, varying in size from that of a pea to that of a marble. The cyst was enucleated without much difficulty. A second incision was made above Poupart's ligament, and a similar cyst exposed; it was situated in the iliac fossa, outside the peritoneal cavity, behind the muscles. It extended upward toward the lumbar vertebræ and downward into the pelvic cavity. A small portion of the sac which extended high up toward the lumbar vertebræ was not removed, as the operator considered the lesion a cystic sarcoma and inoperable. (The relation of this sac was similar to that in Narath's case, who made an incision in the lumbar fossa to completely remove this portion.) The tumor in the region of the knee-joint was easily removed by enucleation. All wounds were closed without drainage. The patient left the hospital about four weeks after operation with evidence of recurrence in the abdomen, and died a few months later. An autopsy was not allowed.

Gross Pathology. When the tissues were received in the laboratory I was impressed from the clinical history that accompanied them that we were dealing with a unique lesion. Apparently, there were three distinct cystic tumors, as Dr. Baer informs me that there was no evidence of communication between the tumors above and below Poupart's ligament. The contents of the cysts were similar—blood-stained fluid containing leukocytes and numerous swollen round cells, resembling endothelial cells. The wall of each cyst was a distinct membrane; the lining of each was hemorrhagic, in places smooth, in other places thrown into folds, and here and there small excrescences, as described in the previous cases. These nodules are a characteristic formation on the surface of the wall of the cyst. The thickness of the wall varied from 1 to 4 mm.; in the thick portions I could recognize lamellæ separated by minute spaces. The outer wall was composed of loose connective tissue containing fat.

Microscopic Pathology. Under the microscope the cysts had an endothelial lining; in the wall of the cyst there are numerous spaces lined by endothelium; in the thicker portions of the wall there are numerous alveoli filled with proliferating round cells. Dr. Welch considered this picture as histological evidence of a malignant tumor—an endothelioma.

I have been unable to find in the literature a similar observation. It is hard to conceive that the primary tumor was the cyst of the knee, and that the secondary cysts were of metastatic origin. Each tumor impressed one as of primary origin—a dilatation of a lymphatic vessel. There is nothing, therefore, clinically or in the gross pathology which can be regarded as malignant. Of course, it is quite possible that a malignant change has begun independently in the endothelial cells in the wall of each cyst. That the tumor recurred can be explained by the fact that it was not all removed.

I trust that a further study of this case and of the literature may throw some light on the question.

There is an older article on cysts of the thigh, groin, and iliac fossa by Schank.¹ His classification demonstrates the great variety of etiological possibilities.

He divides them into two great classes: (a) cysts related to the spermatic cord; (b) cysts originating from tissue other than the spermatic cord.

Among the cysts which may arise from the tissues of the cord we have the hydrocele, or the so-called hydrocele of the canal of Nuck in the female, or the hydrocele of the cord in the male. These sacs may or may not communicate with the peritoneal cavity; they are, of course, of congenital origin. Sometimes they contain blood. These cysts may be

¹ Archiv f. klin. Chir., vol. lv. p. 316.

multiple and may be situated in the abdominal cavity. We also have the cysts in the groin, inguinal canal, or in the region of the femoral canal, due to closed-off sacs of acquired hernia. The cysts may be single or multiple.

Of the cysts which form from tissue other than the spermatic cord there are the atheromatous and serous cysts of the skin and the hygroma of the muscle sheaths, the true lymph cysts which we have just described, the dermoid and echinococcus cysts. The possibility of a blood cyst, a hæmangioma, is not discussed by Schank.

This very interesting communication, which has not been duplicated in recent literature, demonstrates the numerous possibilities in the differential diagnosis of tumors in the upper portion of the thigh.

Czerny¹ considers only the tumors and pseudotumors in the adductor region of the thigh. I was impressed with the value of this article after I saw a case with Dr. Watts, the assistant resident surgeon of Johns Hopkins Hospital. His patient had a diffuse tumor occupying the adductor muscles close to the pelvis of but a few months' duration. There were no signs or symptoms of a bone lesion. Clinically, it was considered an inoperable sarcoma. The patient, however, was given the benefit of the doubt, and at the exploratory incision the tumor proved to be a gravitating tuberculous abscess. The patient recovered. In a recent observation of my own, in which the tumor was situated in the same region, but on palpation was less diffuse and more like a circumscribed abscess or a cyst, the exploratory incision demonstrated that we had an infiltrating intermuscular sarcoma of the most malignant type. This case will answer as a good illustration of the attitude one should assume with tumors.

The clinical diagnosis was doubtful. The tumor in the adductor region was apparently operable; it had been present six months; however, during the last three months the patient had lost so much flesh and strength that it would be difficult to explain this, except by a general metastasis. In addition he had a cough and expectoration which might have been interpreted as symptoms of tuberculosis of the lungs, which would have suggested that the tumor in the adductor region was a gravitation tuberculous abscess from a tuberculous focus in the pelvis or vertebræ. The physical examination, however, of the lung was negative, and the slight expectoration contained no tubercle bacilli. At the operation, demonstrating that the tumor was an intermuscular sarcoma of the most malignant variety, I felt that the patient for the few months that he had to live would be more comfortable if the tumor was not disturbed. An attempt at local excision might have demonstrated its impossibility

¹ Deutsche med. Wochenschr., 1903, vol. xxix. p. 397.

without ligation of the femoral vessels, which in the majority of cases would have necessitated amputation. The patient remained in the hospital for four days after the exploratory incision under cocaine. During the few months that he lived he was able for the greater part of the time to walk about and suffered no discomfort from the tumor.

This question as to our proper attitude toward benign and malignant tumors is especially illustrated in lesions near the vessels of the thigh. One should not mutilate a patient by a hip-joint amputation for those tumors of a relatively high degree of malignancy, if experience teaches that death is practically certain from internal metastasis, unless the tumor itself is giving sufficient discomfort to justify amputation.

On the other hand, if the tumor is of a relatively low grade of malignancy in which metastasis can be expected late, one is justified to perform an operation of any extent, if the chances are good that it will ensure a permanent cure.

BLOOD CYSTS OF THE THIGH. In my investigations on the subject of lymph cysts I was reminded of an observation of my own which, I think, was a venous cyst. The patient was a married woman aged twenty-eight years. She came under my observation in January, 1900, because of a swelling in the right groin, which had been present about a year. There was no history of traumatism. The patient was delicate and frail. The examination was negative, except for the tumor situated to the outside of the vessels in the right side of the groin. The tumor was apparently spherical; the skin was normal; the femoral artery was felt to pulsate over the inner medial anterior surface. The tumor was firm in consistency and there was no pulsation. It extended behind the vessels and occupied the upper portion of Scarpa's triangle below Poupart's ligament. It did not fluctuate. There was no œdema of the leg below the tumor. It seemed to be definitely circumscribed. At that time, five years ago, my experience and knowledge of tumors in this region was very scanty, but I find in my notes the statement that the probabilities of a sarcoma are very slight on account of the duration of the tumor—one year—and the absence of any evidence of local infiltration; that its position behind the vessels excludes a metastatic tumor to the glands in this region, and that the diagnosis lay between a benign connective-tissue tumor and a tuberculous abscess. Before operation the patient's blood count demonstrated chlorosis (hæmoglobin, 55 per cent.; red cells, 5,000,000). At the exploratory incision the capsule of the tumor was exposed between the vessels and the sartorius muscle; in the fascia and fat over the capsule there were numerous veins. Quite a number of this plexus of veins had to be divided before the capsule was reached. The external circumflex artery passed over the inferior border and was divided; having exposed the capsule, I was able to demonstrate fluctua-

tion. I must confess that at this point I did not know how to explain a cyst in this region. The tumor was aspirated, the contents were clear; on standing it coagulated. There was no evidence of blood. In view of the close proximity of the large femoral vessels to the capsule of the tumor I thought it best to open the cyst before attempting enucleation. The walls varied from 2 to 3 mm. in thickness, and attached to the inner wall were partly organized lamellæ of fibrin that one frequently sees in an aneurysm. The incision into the cyst immediately allowed the evacuation of its clear fluid and relieved tension; in a moment from the depth of the cavity there welled up blood of such an amount that one could be quite certain that the cyst communicated either directly with the femoral vein or a large branch. The hemorrhage could be stopped by packing. It could be lessened by pressure on the femoral artery. The loss of blood even in these few moments was sufficient to affect the patient's pulse. For this reason, in view of the benign character of the cyst and its intimate relations to the femoral vessels, I considered an attempted excision out of the question. In the first place, the general condition of the patient contraindicated a long operation; in the second place, to completely remove the cyst the femoral vessels might have to be ligated.

The packing, which was placed unusually tight, was removed slowly. The wound filled with granulation tissue and the patient left the hospital at the end of about six weeks with a small fistula. I thought that I had accomplished a cure, yet there was one observation that suggested that the endothelium-lined cavity would act in the same stubborn way as one lined with epithelium. From this fistula the amount of serum discharged was copious, a discharge never observed from simple granulation tissue; in addition, there were a few slight hemorrhages. The patient was comfortable for about eight weeks, and then returned to the hospital, because of the copious discharge which now and then was hemorrhagic. Occasionally, the external opening of the sinus would close; then the patient would suffer a great deal of discomfort; material evidently accumulated, because in a few days it spontaneously opened. The danger of a complete excision was explained to the patient; she refused to allow any operation which endangered the limb.

Every possible local application failed to accomplish healing. The patient was showing signs of loss of strength due to the copious serous discharge with now and then considerable hemorrhage. At the second operation I attempted to remove as much of the cyst wall as was possible without jeopardizing the femoral vessels. A second incision was made in the adductor region and a portion of the cyst behind the vessels removed. The cyst was found to practically surround the great vessels, except on their anterior surface. This portion of the cyst wall could not be removed.

Healing was not accomplished, and the patient died of exhaustion three years and nine months after the first operation.

With our present knowledge it would have been better, in this case, at the first operation, after the aspiration to do nothing, observe the patient, and, if the tumor showed a tendency to become larger, to explain the nature of the disease and the possibility of the loss of the limb in order to cure it. Then, at the operation, one could first expose and separate the femoral vessels. If this could be accomplished without their injury a complete removal would be possible; if not, the vessels could be ligated and the cyst excised. If gangrene developed later the patient would lose the limb, either above or below the knee. That is, ligation of both femoral vessels is not always followed by gangrene; when gangrene does take place the line of demarcation is usually below the knee. I am quite convinced that even at the second operation, if my patient had given her consent, her life could have been saved, perhaps at the expense of the limb.

I have searched everywhere for similar cases. Hewett¹ reports an observation of a blood cyst in the thigh in a woman aged twenty-five years. The cyst was incised and the thin membrane dissected out; it was only slightly adherent to the femoral vessels; the patient was traced for three years without recurrence. The observation of George Lawson² in the first instance was considered a blood cyst of the thigh. The patient was a woman aged fifty years; the fluctuating tumor the size of an orange on the lower and inner part of the right thigh had been observed ten months. Lawson, at the operation, after the skin incision, aspirated dark blood and for this reason amputated the thigh in the middle third. In the pathological note the so-called blood cyst resembled the cysts in Baer's case just described, and a histological diagnosis of an endothelioma was made. The patient was observed five years later with a recurrence in the stump. Death took place and the autopsy demonstrated metastasis. E. Le Beck³ observed what he considered a blood cyst in the thigh. The patient was a female aged forty-seven years. The symptom of onset was intense pain in the knee followed by the formation of a tumor. Beck saw the patient at the end of four months. The tumor was situated on the inner side of the lower portion of the thigh, extending from the patella to the popliteal space; it fluctuated; there was no pulsation. At the aspiration he removed blood. The relaxed cyst immediately refilled. The treatment consisted of aspiration and compression dressing, which after a number of weeks accomplished a cure. The question naturally arises, Was this a blood cyst?

¹ British Medical Journal, October 24, 1857, p. 897.

² Transactions of the Pathological Society of London, 1867, vol. xviii. p. 272.

³ Gazette des hôpitaux, October 2, 1886, vol. lix. p. 921.

It impresses me that the possibility of a hemorrhagic bursitis in a hæmophilic patient must be considered.

Ahrens¹ reports a very interesting observation in which, after a supra-condylar fracture of the femur with union in a faulty position, the constant trauma to the knee-joint produced a recurrent hæmarthrosis or blood cyst in the knee-joint. Repeated aspiration of the bloody exudate did not relieve the condition; an osteotomy correcting the deformity did. The patient gave a history which we must interpret as indicating a hæmophilic dyscrasia.

Sarcoma of the Skin. The classification which I suggested in 1903² was as follows: 1. Lymphangiosarcoma, with or without a history of congenital mole. 2. Hæmangiosarcoma, with or without a history of congenital nævus. 3. Sarcoma arising in skin scars. 4. Mycosis fungoides. To this I should like to add a fifth, sarcoma arising in fibroma or true keloid of the skin, or in fibroma molluscum. So far in the experience of the surgical clinic, or from the extensive study of the literature, I can find no recorded cases of a permanent cure in the first two groups. One must, therefore, be on the lookout for the congenital mole and nævus, which have a tendency to become malignant later in life and urge their removal in the benign state. Since 1903 the number of these benign tumors which have been received in the surgical pathological laboratory has increased, I should think, at least twenty times. The curability of the sarcoma which arises in the skin scar or in the fibroma varies according to the histology. The prognosis in the round-cell tumors is bad, in the fibrospindle-cell tumors it is good.

Recently two very interesting cases of sarcoma originating in the bed of the nail of the thumb have come under my observation. Plate II. is a painting of a sagittal section through the amputated right thumb. The pigmented tumor in the bed of the nail is beautifully illustrated. The patient was a male aged fifty-two years; three years and nine months ago he received a contusion to this nail and three months later observed an area of pigmentation which increased in size, and a fungus growth appeared from beneath the nail at the end of the thumb. About two years ago this was partially removed; eight months ago he observed enlarged glands in the axilla. At the operation the thumb was amputated and the glands in the axilla removed. The glands showed the same deep pigment observed in the tumor. The microscopic study of the tumor (Fig. 30) demonstrates it to be a pigmented lymphangiosarcoma. This patient died a few months after operation.

The second case is of special interest because the lesion was diag-

¹ Zeitschr. f. orth. Chir., 1904, vol. xiii. p. 357.

² PROGRESSIVE MEDICINE, December, p. 149.

PLATE II.



Sarcoma of skin.

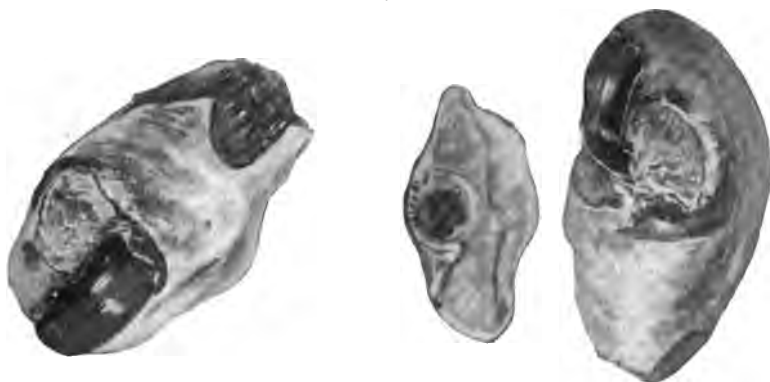
nosed senile gangrene and the thumb amputated. It is now four months since the operation, and the patient has symptoms of internal metastasis. Fig. 31 pictures the specimen as it was received in alcohol in the labora-

FIG. 30



tory. The pigmented streak of the remaining half of the nail and a fungous pigmented ulcer occupying half of the bed of the nail would

FIG. 31



allow a positive diagnosis. A sagittal section (see central figure) shows a finely granular pigmented tumor pretty well circumscribed. The microscopic picture of this tumor was identical with that shown in Fig. 30.

This patient was a white woman aged seventy-six years, who received a traumatism to this nail one year before operation, which was followed by a pigmented stripe beneath the nail shown in the illustration. In the next few months nothing was observed except an increase in the width of this pigmented stripe. Three months after the traumatism she injured the nail again; half of the nail was then shed and revealed the pigmented fungous ulcer shown in the illustration.

Tumors arising from the bed of the nails are rare. This is my third observation. The other patient came to the clinic with an inoperable metastatic tumor in the right groin. A pigmented tumor which he had not observed was found by Dr. Cushing beneath the nail of the great toe. The patient died a few months after leaving the clinic.

Finger Tumors. These three cases stimulated me to the investigation of the literature on the subject of tumors of the fingers. They are so rare that they receive scanty mention in text-books, nevertheless knowledge of this subject is of great practical importance. The most recent article among the very scanty literature is by Suter,¹ who in reporting a single observation refers to the most recent and complete contribution by Müller.²

Müller was able to collect 16 cases from v. Bergmann's clinic in Berlin, and classified them as follows: lipoma, 2 cases; ganglia, 5 cases; encysted foreign bodies, 2 cases; fibrosarcoma, 6 cases; sub-ungual perithelioma, 1 case.

LIPOMA OF FINGERS. I have never observed a case. Müller's 2 cases are of great interest. In one the patient was aged seventy-two years. Forty years before, at the situation of the lipoma, he received a small injury which left a scar; six years ago only he observed a small tumor on the dorsal surface of one of the fingers. The tumor was 1 cm. in diameter and had the distinct lobulations of a lipoma. It was easily removed by enucleation. In the second case the patient was a child a year and a half of age. The tumor had been observed by the mother sixteen months. It was the size of a bean and smooth, it did not have the lobulation of the lipoma on the dorsal surface.

Steinheil³ has reported 14 cases of lipoma on the hands and fingers, Richardson⁴ 3 cases. This was practically all the literature on the subject that Müller could find, sufficient, however, to disprove the statement of Busch⁵ that they never occur on the fingers. It is interesting to note that when the tumors are situated on the extensor sur-

¹ Archiv f. klin. Chir., 1905, vol. lxxv. p. 624.

² Ibid., 1901, vol. lxiii. p. 348.

³ Beiträge zur klin. Chir., 1891, vol. vii.

⁴ Northumberland and Durham Medical Journal, July, 1900.

⁵ Archiv f. klin. Chir., vol. vii.

face, perhaps on account of the thinner skin, the lobulation of the lipoma can be made out clinically, but when they are situated on the flexor surface the tumor is smooth and tense, and for this reason is frequently mistaken for a ganglion. Little is definitely known to explain in all cases the etiology and localization of lipoma. Grosch¹ has formulated the rule from his extensive observations that lipomata develop in regions of the skin where the glands are scanty; in the skin of the fingers the glands are most numerous. This may explain the rarity of lipoma. Yet, on the other hand, single or repeated trauma has been considered an etiological factor; for example, the lipoma of the shoulder in hod-carrying laborers. Yet the fingers are subjected to more traumas than any other part of the body.

GANGLION OF THE FINGERS. In Müller's five cases none were subjected to operation except in a few in which the cyst was ruptured by pressure. He was unable to ascertain the result of this treatment and does not recommend it. The chief point in diagnosis is that the ganglion is situated on the flexor side and has a lateral position near the tendon. This is a new point in diagnosis with which I was not familiar. Ganglia, as a rule, give so little trouble that few patients seek the advice of the clinic. One should, however, leave them entirely alone or subject them to removal by open incision.

ENCYSTED FOREIGN BODIES IN THE FINGER. The first case is of interest because it illustrates the histological picture of the early inflammatory stage about an apparently sterile foreign body. The patient was a male aged thirty-five years; three weeks before the operation in picking leaves a small thorn pierced and buried itself in the skin. The primary swelling disappeared in two days, leaving a movable, painless, shot-like tumor beneath the skin on the extensor surface of the right, middle finger. At the operation the skin was normal, and a small nodule was excised. This nodule consisted of a small cavity containing a vegetable thorn. Microscopically the tissue near the lumen contained many polymorphous leukocytes, a few giant cells in a cellular stroma; the next zone consisted chiefly of fibroblasts and capillaries in a cellular stroma, very few leukocytes, and no giant cells. The next zone was chiefly fibrous tissue, beyond which was the normal fat and loose connective tissue present in this region. I describe this histological picture in detail because granulation tissue is sometimes very difficult to differentiate from sarcoma. I shall mention this subject again.

The second case illustrates the older histological picture of an encysted foreign body. The patient was a female aged twenty years. She recollects that while ironing six months ago she had a sharp, stabbing pain

¹ Deutsche Zeitschr. f. Chir., vol. xxvi.

in the ball of the right thumb, but could find no wound or see any blood. Since this time certain motions of the thumb have been painful. At the examination one could make out in the ball of the thumb beneath the normal skin an area of induration. At the operation a fibrous mass was excised which contained in its centre a needle. Microscopically the outer wall was more fibrous than in the preceding case and more sharply circumscribed from the surrounding normal fat and muscle. In the central zone, as in the previous case, there were still capillaries to be seen and fibroblasts.

The inner zone, next to the lumen, was composed chiefly of an intercellular substance in which there were a few cells and fibroblasts with pigment, here and there blood pigment. There were no polymorphous leukocytes and no giant cells.

One should bear in mind the possibility that an encysted foreign body may be the etiological factor in a tumor formation. A small sequestrum of bone from a healed osteomyelitis may be the foreign body. In this case the patient would give no history of injury, and the symptoms of subacute osteomyelitis may have been forgotten. I recollect such an observation in the breast. The patient presented herself with a clinically doubtful tumor. It felt like a small infiltrating scirrhus, but there was no change in the subcutaneous fat or skin, and the nipple was not retracted; it had been observed two or three years. At the exploratory incision there was an area of fibrous tissue in the lumen, of which there was a minute bone sequestrum.

FIBROSARCOMA OF THE TENDON SHEATHS. These are the most common tumors. They are observed both in youthful and older people, they are of slow growth, usually painless, and are situated on the flexor side. At the examination the tumor, as a rule, is distinctly encapsulated and very hard. At the operation the tumor is attached to the sheath of the tendon and easily removed by enucleation. Müller followed all of his six cases and observed no recurrence. Histologically, Müller's tumors were chiefly composed of spindle cells. In addition, there were many giant cells, only a very few vessels, and here and there small areas of free blood and blood pigment. Müller felt that he could positively demonstrate the origin of these tumors from the sheath of the tendon. He compares these tumors to the fibrospindle and giant-cell epulis, which, we know, is a tumor of a low grade of malignancy. In one of his cases in which the tumor was larger it pressed upon the phalanx and had produced a small concavity (pressure atrophy of bone), but the periosteum between the tumor and bone was intact. The literature on these tumors is scanty. He gives four references in which the clinical and histological description agrees with his own.

I have previously discussed the experience of the surgical pathological

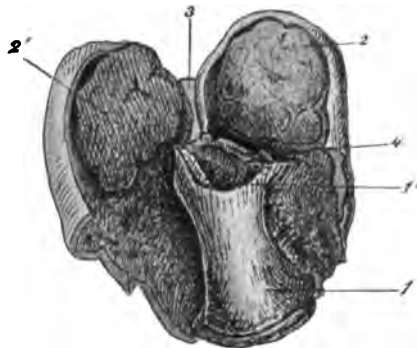
laboratory.¹ My observation on 7 cases is somewhat similar to Müller's. In one of the patients, however, the tumors were multiple, and in one the tumor was present on the extensor tendon. In one case the tumor was a pure cedematous fibroma with a few areas of recent hemorrhage surrounded by round cells, which I thought could be explained by the recent trauma. This tumor had been present for the last twenty-five years. The patient sought the advice of the clinic because the tumor had become painful after a recent trauma. Of the other cases one was a pure spindle-cell tumor, 3 fibrospindle-cell tumors, and in only 2 cases were the tumors fibrospindle giant-cell, similar to the case of Müller. All of these patients have remained well since the removal of the tumor.

It is a question in my mind whether these tumors should be called sarcoma. The experience of Müller and the authorities referred to, as well as my own, fail to find a single instance of such tumors exhibiting a single characteristic of a malignant tumor except histologically.

FIG. 32



FIG. 33



Suter's² observation is of particular interest on account of its unusual situation beneath the nail and because it produced pressure atrophy of the end phalanx. The patient was aged thirty-nine years, and gave a history of an incised wound of the end of the left thumb which healed properly and in the scar of which he observed no symptoms for four years. Now, four years before he came to the clinic, his attention was called to the end of his thumb by pain and tenderness, and he observed a growth projecting from the finger between the nail and the flesh. It was treated for ingrowing nail without relief. He sought advice in the clinic because of increasing pain and weakness in this thumb. Fig. 32

¹ PROGRESSIVE MEDICINE, December, 1903, p. 171.

² Loc. cit.

is an *x*-ray of the finger. It illustrates the outline and position of the tumor and the irregular destruction of bone. The nail over the tumor was thin, and the portion of the tumor which projected between the nail and the skin had a slightly ulcerated surface. Histologically, the tumor removed by amputation was chiefly a pure fibroma, but the portion toward the bone was cellular, contained areas of blood and pigment, and resembled somewhat a sarcoma. The gross appearance of the tumor is shown in Fig. 33. I am impressed that this tumor is not from a tendon sheath, but either a fibroma in scar tissue or a periosteal fibroma.

FIG. 34



Its long duration and the character of the bone destruction are indications of a benign tumor or one of a very low grade of malignancy. In his discussion of the literature Suter adds nothing which has not already been given us by Müller, except Gurlt's statistical statement that among 14,630 tumors but 84 were situated on the hand and fingers, and the majority of these on the hand.

A recent observation of my own is of sufficient interest to discuss here from the fact that the subcutaneous tumor had been present on the extensor surface of the finger and to the lateral side of the tendon, which

PLATE III.

a.



S.H.

b.



Fibroadenoma of skin.

is the usual position of a ganglion. The second point of interest is that the patient, a colored woman aged fifty years, caught the finger between the door and the post, tore the skin and almost enucleated the encapsulated neoplasm. Fig. 34 shows the tumor and its prolapsed portion. The injury had taken place only three days before. The tumor was easily removed by enucleation. Plate III. *a* is a painting of the prolapsed portion of the tumor which is covered with a dried blood clot, black in color, and the surrounding pigmented skin of a colored woman. Plate III. *b* is a gross section through the tumor. The prolapsed portion is separated from the subcutaneous portion and is covered with a dried blood clot. The tumor has the appearance of an œdematous fibroma with areas of recent hemorrhage. Microscopically it is chiefly a pure œdematous fibroma with areas of hemorrhage surrounded by cell proliferation. There are no giant cells.

SUBUNGUAL PERITHELIOMA. The one observation of Müller is of great interest because it describes a tumor beneath the nail, clinically benign, histologically malignant, a tumor which I have never observed and one which differs clinically and histologically from the three pigmented alveolar sarcomata which I have described in the beginning of this subject. The patient was a female aged forty-four years. She gave a history of contusion to the nail of the right fourth finger, since which time she has observed a bluish area beneath the nail, which was very painful and tender; increase in size has not been observed; the nail had not been lost; she sought the clinic on account of pain and tenderness. At the examination the nail was thin, beneath the nail there was a blue elevated area. At the operation, after extracting the nail, a flattened, spherical tumor 1 x 1.8 x 1.4 cm. was found. This tumor pressed upon the bone, and produced a depression, but between the encapsulated tumor and the depressed bone the periosteum was intact. The tumor was removed without amputation. Clinically and gross-pathologically one can interpret this small tumor only as benign, yet histologically it was a cellular tumor in which the cells were arranged about capillaries. The tumor had an epithelial covering derived from the germinal layer of the nail. I shall not go into the minute histological description nor the discussion, but the tumor is composed of small capillaries. Outside of this layer of normal endothelium there are areas of proliferating roundish cells which morphologically are not the germinal epithelium of the capsule. The portion in which there are no cells and no nuclei is considered by Müller to be due to regressive changes; that is, a substance due to the degeneration of the cells of the tumor. Müller was able to find in the literature similar observations by Kraske, Schuh, and Volkmann. In all of these observations the tumor was clinically benign and of long duration. The patients sought advice in

the clinic because of pain and tenderness which in Kraske's case made the patient so miserable that she was treated for a number of years for neurasthenia. In none of these observations was recurrence or metastasis noted. In Kraske's patient amputation was performed which Müller, quite correctly, considers unnecessary.

Periosteal and medullary sarcoma of the bones of the finger must be unique. Müller could find none, and in the literature since then I have been unable to discover any reports. Codman¹ observed a medullary myxoenchondroma of the second phalanx of the finger, and in Heineke's case² of multiple benign bone cysts one cyst was noted in the phalanx of the great toe, but none in the fingers.

Inflammatory lesions of the soft parts and bones of the fingers are much more frequent. A finger removed by amputation on the diagnosis of periosteal sarcoma was sent to my laboratory recently, but the pathological examination demonstrated it to be an ossifying leucic periostitis. The fibrous nodes observed on the fingers and the bony growth in chronic arthritis deformans are not difficult to recognize.

Epithelial tumors on the fingers are also rare, except perhaps the benign papillary wart. I have recently observed an example of a basal-cell epithelioma (rodent ulcer) on the finger which was mistaken clinically for leprosy. I will mention this again under epithelial tumors.

Recent literature gives me no references to the hæmangiosarcoma, the sarcoma arising in skin scars or in fibroma of the skin. This subject I have fully discussed before. It is rather interesting, however, to note that in the cicatricial keloid which so frequently histologically resembles the spindle-cell sarcoma, I cannot find a single instance of a malignant tumor.

MYCOSIS FUNGOIDES. This rare lesion of the skin which I have discussed with illustrations³ and the possible relation of which to Hodgkin's disease I have called attention to,⁴ has recently been considered by Pelagati⁵ as a lesion of the skin associated with leukæmia. His observation with autopsy and blood findings is described in great detail. The original article I could not obtain. The reviewer in the *Centralblatt f. Chirurgie* is inclined to view the diagnosis of mycosis fungoides as questionable, and the blood findings as not positive of myelogenous leukæmia. The possibilities, however, of this rare lesion which may begin primarily on the skin of the extremities should be borne in mind, and the cases when they come under observation carefully studied with blood examinations,

¹ PROGRESSIVE MEDICINE, December, 1904, p. 185.

² Ibid., p. 187.

³ Ibid., December, 1903, p. 163.

⁴ Ibid., December, 1904, p. 175.

⁵ Centralblatt f. Chir., 1905, vol. xxxii. p. 302.

which until the work of Pelagati has been neglected. The *x*-ray should always be tried as a therapeutic measure.

Sarcoma of the Soft Parts. The finding of a subcutaneous or intermuscular sarcoma on the extremities is by no means rare. Although I have discussed this subject in detail¹ I think it should be referred to again to aid me in emphasizing the points that I am anxious to convey in the diagnosis and treatment of these tumors. Sarcomata vary in their malignancy. For the less malignant variety amputation is unnecessary, except when the complete local resection of the tumor would leave a limb without function. In the more malignant variety metastasis takes place so early that amputation should only be resorted to when the tumor, on account of its size or ulceration, gives sufficient discomfort to justify the procedure. These tumors, when they cannot be recognized clinically, can be, when they are exposed at the exploratory incision. There are no observations in the literature, or in my own experience, as far as I can find out, which would indicate that there is any danger in exploring such a tumor to allow a naked-eye diagnosis, provided operative intervention follows at once. As a matter of fact the very malignant lymph- and hæmangiosarcomata produce metastasis so clearly that, even though exploratory incision into the cellular soft tumor produced dissemination, it would not do harm, because dissemination has already taken place. In the less malignant tumors, the different forms of round-cell and spindle-cell and the fibrospindle-cell, the possibilities of metastasis are so slight that I doubt if an exploratory incision increases them. One, however, must be prepared to recognize the nature of the tumor by its naked-eye appearance. As a matter of fact, this is not difficult, and, as I stated before, I have never met with such a tumor in which, if there were any doubt, the frozen section threw any more light on the subject. On the other hand, even to the experienced eye, a wrong conception of the nature of the disease may be given by the frozen section. Recently, at an exploratory incision for enlarged prostate, the operator was in doubt as to whether the hypertrophy was benign or malignant; a piece was removed for frozen section and a report of carcinoma immediately returned. Fortunately the general condition of the patient contraindicated the extensive resection necessary for the complete removal of a carcinomatous prostate. The usual enucleation was performed. The patient recovered. Microscopically, from properly hardened and stained sections, there is not the slightest evidence of carcinoma. If this patient had been in good condition, and the operator had placed reliance on the frozen section, an unnecessary mutilating operation would have been performed.

¹ PROGRESSIVE MEDICINE, December, 1903, p. 165; *Ibid.*, p. 176.

In doubtful cases of breast tumors in which the disease is senile parenchymatous hypertrophy,¹ the frozen sections resemble so closely carcinoma that a mistake would often be made if any dependence were placed upon them.

The following observation of Dr. Finney again illustrates this point:

Pathological No. 6026. Sarcoma of the soft parts. Intermuscular perithelial angiosarcoma of the thigh. Female, aged twenty-eight years, trauma six months, tumor two weeks.

In this patient the rapid formation after a traumatism of an infiltrating tumor in the thigh suggested a sarcoma of relatively high malignancy.

FIG. 35



Myositis ossificans could be excluded by the softness of the swelling and the absence of a bone shadow in the muscles in the *x-ray* negative. At the exploratory incision by Dr. Finney he recognized, from the diffuse growth, and the soft cellular character of the tissue, that he was dealing with a sarcoma of the most malignant variety. The tumor only was excised to relieve the patient of pain. The wound healed per primam, and for the few months that she lived she suffered no mutilation and was relieved of the local discomfort. The gross pathology of this cellular, soft, hemorrhagic tumor which looks something like brain substance is illustrated in Plate IV., Fig. 1. Having seen such a tumor once, one would hardly fail to recognize it again. The microscopic appear-

¹ See Warren, Journal of the American Medical Association, July 15, 1905, vol. xlv. p. 160.

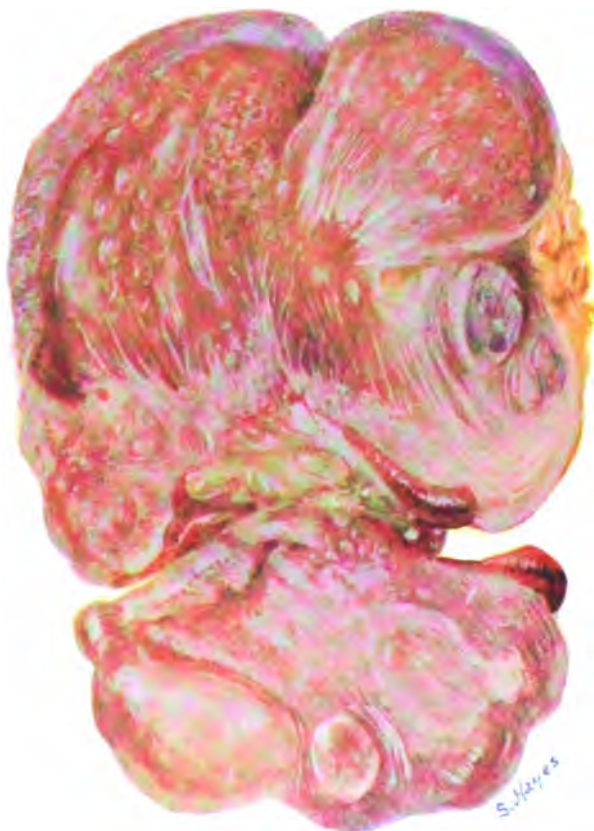
PLATE IV.

FIG. 1.



Sarcoma of the intermuscular tissue.

FIG. 2.



Sarcoma of the leg.

ance is shown in Fig. 35, a round-cell sarcoma arranged about blood-vessels.

In contrast to the above case, which is an example of the most malignant type of sarcoma, the following case illustrates a tumor of relatively low grade of malignancy:

Pathological No. 6207. Sarcoma of soft parts. Spindle-cell and round-cell fibromyxosarcoma, arising from the sheath of the popliteal nerve. White female, aged thirty-six years. Pain four years; tumor eleven months. Two exploratory incisions before admission to the hospital. Amputation of the leg because of local infiltration of the tumor.

This patient was treated for rheumatism because of the pain referred to the knee. The tumor appeared in the popliteal space eleven months ago; it grew slowly and was painless. Three months and six weeks ago an exploratory incision was made into the tumor. The first incision healed, the second remained as a sinus. Since these exploratory incisions the tumor has grown rapidly. It occupies the entire popliteal space. The leg below is oedematous. At the exploratory incision by Dr. Halsted under an Esmarch he was quite convinced that a local extirpation of the tumor would have required ligation of the popliteal artery and vein, and perhaps division of a branch of the popliteal nerve. (This surmise proved to be correct at the pathological examination.) For this reason the leg was amputated in the thigh. The longitudinal incision exposes the femur, the white infiltrating tumor which one can see extends to the capsule of the knee-joint and the muscles of the leg beneath. Plate IV., Fig. 2, represents the naked-eye appearance of the fresh-cut tumor, and one can see that it is much more fibrous and less cellular than the previous case. Microscopically it is composed chiefly of spindle cells which show a tendency to form fibroblasts and fibrous tissue in a myxomatous stroma. The cellular areas are chiefly situated about the sinus left by the exploratory incision, which was lined with granulation tissue.

The prognosis is good. Such a tumor can be removed by local excision, and I am quite confident that if this tumor had been attacked properly at the first exploratory incision three months before she came to the clinic the limb would have been saved. This case is the malignant counterpart of the benign prototype illustrated in Plate I. and Fig. 28, a fibromyxoma of nerve sheaths.

In the experience of the laboratory we have had one benign fibromyxoma of the popliteal nerve, a colored man, aged forty-two years; tumor six years, very large, who has remained well eight years since the excision of the tumor. As the neoplasm was only adherent to the nerve, the nerve did not require resection.¹

¹ PROGRESSIVE MEDICINE, December, 1903, p. 172.

In a second case operated upon by Cushing the patient was a female, aged twenty-three years. The symptoms, which had been present one year, were all referred to the foot. She was treated for flat-foot. As this treatment failed she was sent to the surgical ward. At the examination a tumor was felt in the popliteal space, and there were motor and sensory disturbances indicating involvement of the popliteal nerve (similar to Custodius' case, a fibromyxoma of the peroneus nerve). At the operation Cushing was able to resect the tumor, but it was necessary to divide the sciatic nerve as it passed through the tumor. Histologically this tumor was much more cellular than the previous case. One year

FIG. 36



later there was local recurrence in the stump of the sciatic nerve. Amputation was done. This patient, however, has remained well and free from any symptoms of internal metastasis or local recurrence two years and six months since the second operation. This latter case emphasizes the fact that we are justified in attempting to remove tumors of this character by resection rather than amputation, even if we do run the risk of a local recurrence.

There is no recent literature on tumors in this group. The two articles on this subject which I have read with the greatest interest are by

Kaposi¹ and Burkhardt.² The former, reporting an interesting case of lymphangiosarcoma, discusses the literature; the latter summarizes the experience of Schönborn's surgical clinic in Würzburg on sarcoma and endothelioma.

Benign and Malignant Bone Tumors. BENIGN BONE CYSTS OF THE LONG PIPE BONES. The case of a bone cyst of the upper end of the humerus cured by curetting, which I reported in *PROGRESSIVE MEDICINE* for December, 1903, p. 191, was examined again a few days ago (September, 1905), now over two years since the operation. Fig. 36 shows

FIG. 37



that there is no deformity, except the scar; function of the arm is unimpaired. Fig. 37 shows that there is very slight curvature of the humerus but no positive evidence of cyst formation.

The patient operated on by Dr. Halsted³ has also remained free from recurrence over one year. This case was of special interest, because the medullary cavity of the femur exhibited in addition to the cyst areas of osteitis fibrosa and cartilage. Drs. Corson and Beck⁴ have both written me that their patients have remained free from recurrence.

¹ Beiträge zur klin. Chir., 1901, vol. xxx. p. 139.

² Ibid., 1902, vol. xxxvi. p. 1.

³ *PROGRESSIVE MEDICINE*, December, 1904, p. 183.

⁴ Ibid., December, 1902, p. 154; Ibid., December, 1903, p. 190.

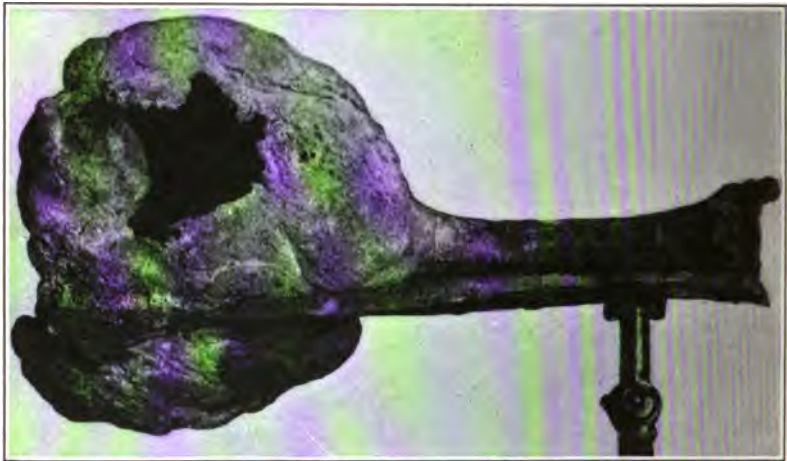
My letters addressed to Dr. Koch and the other German surgeons who have reported cases of bone cysts have remained unanswered.

Dr. Codman's patient¹ has remained well.

Dr. Goldthwait, of Boston, was good enough to send me prints of the *x*-ray studies in his case of multiple bone cysts associated with osteomalacia. As these pictures so closely resemble those of Heineke,² which I have reproduced it is unnecessary to repeat them.

Since 1904 two new cases have come under my observation. One I found in the museum of the University of Buffalo; it had been there a number of years, and there were no clinical data. Dr. Roswell Park, with great courtesy and kindness, had the specimen photographed and *x*-rayed. Fig. 38 is a photograph of the dried specimen and shows a

FIG. 38



large, bony expansion of the upper end of the tibia; the surface, both outside and inside, of the osseous wall, is irregular. There are only two possibilities to explain this bone cavity—a medullary giant-cell sarcoma, or a benign bone cyst. The latter is more probable, because, as a rule, when a giant-cell sarcoma has reached this size it would not expand the bone so abruptly from the lower portion of the shaft, and it, without much doubt, would have broken through the bone capsule at some point. Fig. 39 is an *x*-ray of the specimen. This resembles closely that made from the patient operated upon by Follis³—a huge bone cyst of the lower end of the femur.

¹ PROGRESSIVE MEDICINE, December, 1904, p. 185.

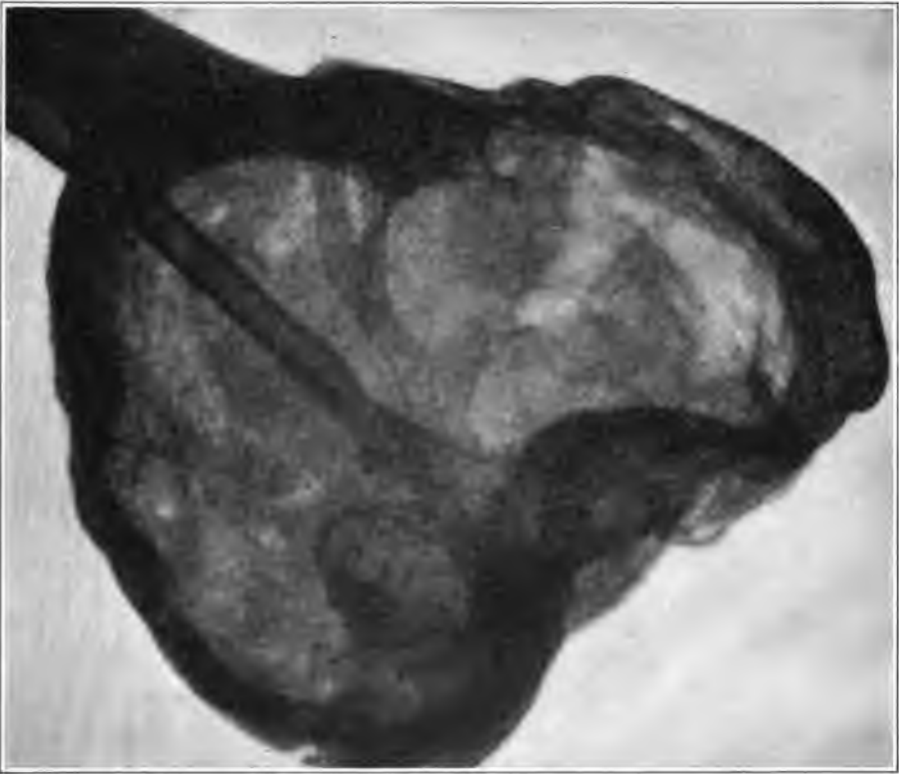
² Ibid., p. 187.

³ Ibid., p. 182, Fig. 40.

The following patient was operated on by Dr. Finney in Dr. Halsted's clinic:

Pathological No. 5644. The patient was a white male, aged eighteen years, who, nine weeks ago, felt pain on motions at the elbow; three weeks later he observed a swelling of the lower end of the femur; for the last three weeks there had been slight redness of the skin and fever. At the examination there was an irregular swelling of the lower end of

FIG. 39



the humerus with œdema of the soft parts, redness of the skin, and fever. The forearm was held flexed at right angle, and attempts at motion gave pain. At the operation the lower end of the humerus had been expanded, in many places the bony capsule was destroyed, and there had been a rupture into the elbow-joint. The cavity was filled with a hemorrhagic granulation tissue, a blood-stained fluid, and attached to the thin shell of bone there was fibrous tissue. The diseased tissue was removed with the curette only. The wound was packed and healed by granulation. I examined this patient the other day, one year since operation: there is

no evidence of recurrence; the elbow is ankylosed, and the forearm in a flexed position. Microscopically, the bone shows absorption with numerous giant cells in the lacunæ; the fibrous tissue adherent to the bone resembles that described in Dr. Halsted's case, that is, it gives a picture of *ostitis fibrosa*. I am inclined to think that in this bone cyst there was a secondary infection. Unfortunately no cultures were taken.

This subject of bone cysts has again been considered with reference to all the German literature by Haberer¹ from von Eiselsberg's clinic in Vienna. He reports 2 cases with photographs of the patients, excellent *x*-ray studies and one microscopic sketch. In one patient there were cysts in the right lower jaw, right parietal bone and left femur in a boy, aged ten years; tumors of seven years' duration. It is interesting to note that after the cyst in the lower jaw had been observed two years, there was a fracture after a trauma which healed. Two years later there was a fracture of the right femur after a slight trauma which healed with deformity. The *x*-ray illustrations do not differ from those which I have reproduced. Small pieces of the tissue from the parietal and femoral tumors were removed, which, when studied histologically, Haberer considered as typical pictures of osteoid sarcoma, and remarks that we have in this case clinically a typical benign bone tumor, yet histologically a malignant one. I cannot take space to discuss his histological description, but I am impressed with the fact that he has found difficulty in interpreting an inflammatory cellular connective-tissue growth which is always present in the walls of these bone cysts, and may be described as *ostitis fibrosa*. The interpretation of the histological picture in bone lesions is in many cases much more difficult than the recognition of the benign or malignant character of the lesion by the naked-eye appearances. In his second case no operation was performed. The cyst was situated in the humerus and during a period of three and a half years there were three fractures, all of which healed.

Von Mikulicz,² in the discussion of this paper, describes an observation of his own in which, for a large cyst in the upper end of the humerus, he made a small incision and injected the cavity with iodoform-glycerin; the closed wound healed per primam. Two years later the *x*-ray demonstrated that the cyst cavity was filled with solid bone. Three years later the boy was still well. As the histological examination of the piece excised from this case resembled that in Haberer's, one can be quite confident that the lesion is not malignant. This observation of von Mikulicz also teaches us that extensive operative intervention is unnecessary. In my own case, also a cyst in the humerus, I simply opened the

¹ Archiv f. klin. Chir., 1905, vol. lxxvi. p. 559.

² Centralbl. f. Chir., 1904, vol. xxxi. p. 1323.

PLATE V.



Giant-cell sarcoma of bone.

bone cavity and put in a small piece of gauze, after curetting and allowing the cavity to fill with blood.

GIANT-CELL SARCOMA OF BONE. The case of medullary giant-cell sarcoma of the upper end of the tibia, which I reported with illustrations in 1903,¹ was examined a few days ago; it is now two years and nine months since operation; the bone cavity is almost covered with epithelium; there is no evidence of recurrence; the function of the limb is unimpaired. Fig. 40 is a photograph of the result taken about one year ago. One

FIG. 40



will note that the upper portion of the bone cavity is still uncovered by epithelium; at the present time this ulcer is very much smaller.

The other cases of giant-cell sarcoma observed in Prof. Halsted's clinic, mentioned and briefly discussed at that time, have all been heard from within a few weeks. All the patients are well and free from symptoms of recurrence.

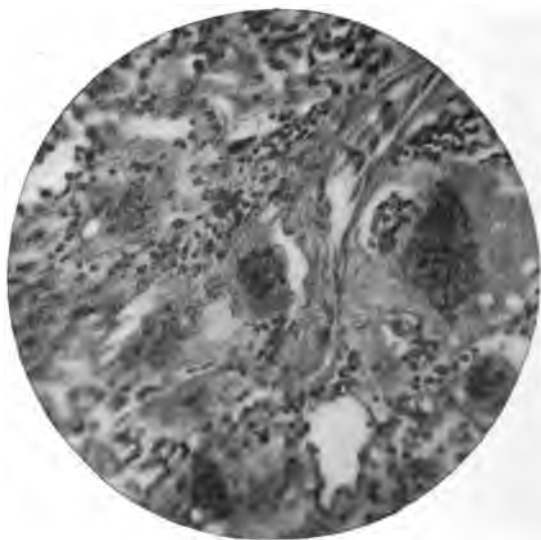
Since 1903 only two further examples of giant-cell sarcoma have come under my observation. One, a patient of Dr. Halsted, in whom the tumor was situated in the lower end of the radius; the other, a patient of Dr. Finney, in whom the tumor was situated in the lower end of the tibia. I was able to obtain a painting from the fresh specimen in Dr. Halsted's case. I reproduce it here (Plate V.) because no similar illustration has appeared in the literature. Part of the bony capsule has

¹ PROGRESSIVE MEDICINE, December, 1903, p. 201.

been removed in order to show the characteristic appearance of the medullary giant-cell tumor, which looks like hemorrhagic granulation tissue, in which one can see white and yellow dots and lines. In this instance Dr. Halsted resected the lower end of the ulna and radius, although the medullary tumor at one point had broken through the bone capsule and had infiltrated the surrounding muscle. This infiltrated tissue was also excised.

I have mentioned before¹ a case of pulsating periosteal giant-cell sarcoma of the lower end of the ulna in which the surrounding muscles were infiltrated. In this instance also resection was performed. This

FIG. 41



patient remained well and free from recurrence for twelve years and has been lost track of since.

The operation performed by Dr. Halsted in this last case is of too recent date to judge of the ultimate result. The patient was a white male, aged twenty-two years; there had been pain and tenderness in the lower end of the radius for twenty months, swelling for one year. At the examination and from the *x*-ray one could be certain of a medullary tumor producing an abrupt and uniform expansion of the lower end of the radius. I do not think a positive differential diagnosis could have been made between a bone cyst and a medullary giant-cell sarcoma, except this locality is rare for a cyst, and quite common for giant-cell sarcoma. Counting this case, we have had four such tumors in this region. The tumor is shown in Fig. 41. Note the giant cells, some of which are in cavities lined with endothelium, probably capillaries.

¹ PROGRESSIVE MEDICINE, December, 1903, p. 203.

The best histological study of giant-cell tumors that I have been able to find has been written by George Friedländer.¹ He is inclined to view these tumors as chronic vascular inflammatory processes or benign angiomata, and that the giant cells are produced by the budding of endothelial cells in endothelium-lined spaces. My own observations on these tumors in many instances agree with Friedländer. There is no doubt that these giant-cell medullary and periosteal bone tumors have a very low grade of malignancy.

Mr. Schapiro has been collecting cases from the literature, and as far as this investigation had proceeded, he has been unable to find a single instance of this pure giant-cell tumor which has given metastasis. At least 50 cases have been examined.

The microscopic diagnosis of a giant-cell sarcoma should not be made simply because the tumor contains a few giant cells, nor must all multinuclear cells be interpreted as giant cells. In all round-cell sarcomata large polynuclear cells are almost always found. For this reason I feel justified in criticizing the diagnosis of Farrar Cobb² "undoubted giant-cell sarcoma" in his case, in which the patient died of internal metastasis nine months after an interscapulothoracic amputation for a periosteal sarcoma involving the upper portion of the humerus. The pathological report by Dr. Whitney states that the new-growth almost encircled the upper portion of the shaft of the humerus and was 8 cm. in extent and 3 cm. in thickness. The cortical bone showed erosion, and there was apparent extension into the medullary cavity. The circumflex vein was filled with a thrombus of the new-growth which extended to and slightly projected into the axillary vein. Microscopically the tumor was composed of large round cells of irregular shape and size mixed with many multinucleated ones. Diagnosis, "giant-cell sarcoma of periosteal origin with extension into the vein." This microscopic note describes a round-cell periosteal tumor of the most malignant type, one which, in my experience and from the reading of the literature, has always been associated with early internal metastasis. This case also illustrates that in these very malignant tumors no better results are obtained by a very extensive and high amputation than by a less extensive intervention.

Subperiosteal Resection for Medullary Sarcoma. The observation reported by Blecher³ is one of great importance to those who feel that conservative measures should be employed in certain forms of bone sarcoma. Unfortunately, in this case the microscopic report is so meagre that one cannot be certain as to the exact nature of the neoplasm. Blecher simply states that microscopically the tumor was a "Grosszelliges Sarkom," a large-celled sarcoma; whether he means by this a giant-cell sarcoma

¹ Archiv f. klin. Chir., 1902, vol. lxxvii. p. 202.

² Annals of Surgery, February, 1905, vol. xli. p. 267.

³ Deutsche Zeitschr. f. Chir., 1905, vol. lxxviii. p. 597.

for which all previous authorities use the term "Riesenzell-Sarkom," I do not know. The excellent description of the fresh appearance of the tumor, however, impresses me that it was a giant-cell sarcoma. The patient, a male aged twenty-one years, was admitted to the clinic with a fracture in the upper third of the humerus. As there had been pain in this locality for six months, and as the fracture had taken place after a comparatively slight trauma in an otherwise strong young man, and as the crepitus was soft, the possibility of a medullary bone sarcoma was immediately considered. This diagnosis was confirmed by the *x*-ray. At the operation Blecher found a thin shell of bone which, when opened, revealed some dark hemorrhagic fluid and a bone cavity filled with dark-red, soft tissue. As the medullary tumor involved the head of the humerus and the shell of bone in places was so thin Blecher preferred to remove the disease by a subperiosteal resection, including the head of the humerus, rather than a curetting; 14 cm. of the shaft were removed and the periosteal cavity was lightly packed with iodoformized gauze. The arm was treated in extension. An *x*-ray was taken four months after operation. At this time the patient had perfect use of the hand and forearm, but considerable restriction at the shoulder-joint, but no shortening. The function gradually improved and in June, 1905, eighteen months after operation, there was no evidence of recurrence, no shortening, and considerable motion at the shoulder-joint; an arm, therefore, with but slight impairment of function. If this tumor belonged to the malignant variety of medullary sarcoma evidence of internal metastasis would, from our knowledge of these cases, have been present by that time. Therefore, from the gross description and the ultimate result, we can infer justly that the tumor was a giant-cell sarcoma. Blecher is of the opinion that he is the first to advocate subperiosteal resection, and he was rather surprised at the amount and rapidity of the bone regeneration. He is, therefore, not familiar with Nichols¹ clinical and experimental study of the regeneration of bone after subperiosteal resection, which he advocates, of osteomyelitis. Also, Blecher, in discussing the literature on resection of bone sarcoma, which I presented in detail in *PROGRESSIVE MEDICINE* for December, 1899, fails to recollect that von Mikulicz and others were dealing with the most malignant varieties of medullary bone tumors and resected the periosteum to give the disease a wider berth. Blecher's observation, however, is important in the treatment of those giant-cell sarcomata which cannot be completely removed by curetting. A pathological knowledge of the more malignant medullary tumors demonstrates the impossibility of removing such tumors by subperiosteal resection.

¹ *PROGRESSIVE MEDICINE*, December, 1904, pp. 206-215.

PRACTICAL THERAPEUTIC REFERENDUM.

By H. R. M. LANDIS, M.D.

AFTER considerable delay the eighth decennial revision of the *Pharmacopœia* has appeared, and became official on September 1, 1905.

There are several important points in the new edition which are worthy of attention. These have been published by Hunt and Motter in *Bulletin* No. 23 from the United States Hygienic Laboratory. In regard to changes in terminology, new synthetic remedies have not been admitted under their trade or commercial names, but have been given names which indicate as closely as possible their chemical composition. Thus, *aristol* becomes official as *thymolis iodidum*, showing that it is an iodine compound of thymol; *salol* is now officially known as *phenylis salicylas* indicating the combination of phenol and salicylic acid. Another recommendation for this method of naming new compounds is that not infrequently the same substance is marketed under a number of different names. Failing to obtain any results with one of these preparations, a physician may try in succession several of them, thinking he is using a different drug, when in reality he is prescribing the same thing.

Chemical names have been used as far as possible, and a knowledge of a comparatively few well-known substances will readily show the relations of the new ones to these and how slight the modifications are.

It is not possible to indicate all of the official changes in names. In all 160 changes were introduced. Among the better-known drugs the following changes have been made: Acid carbolicum to phenol; chloral to chloral hydratum; acidum arsenosum to arseni trioxidum; apomorphinæ, cocainæ, hydrastinæ, quininæ hydrochloras to hydrochloridum; hyoscina, hyoscyamina, quininæ hydrobromas to hydrobromidum; veratrum viride to veratrum. Furthermore, all of the "extracta fluida" have been changed to fluidextracta.

An important reason for using the official names is that frequently the same substance is sold under a registered or fanciful name at a much higher price than under the chemical name.

Another extremely important change is the placing of the preparations of the heroic remedies on a uniform basis. The great majority of the tinctures are now 10 or 20 per cent. in strength; the more powerful ones are all 10 per cent. Tincture of aconite, which was formerly 35 per cent.,

has been reduced to 10 per cent., and tincture of strophanthus, formerly 5 per cent., has been increased to 10 per cent.

In the matter of additions the Committee on Revision has been very liberal. Recognizing the popularity and demand for certain combinations of drugs, a number of them have been made official and the proportion of their ingredients fixed. This will ensure purity to the physician and cheapness to the patient. No drug or combination of drugs has been admitted to the *Pharmacopœia* on which a patent still exists. The number of extra-pharmacopœial preparations is now so small that there is very little excuse for any one prescribing a non-official preparation. In regard to dosage, the average approximate dose for adults is given. No attempt is made to fix a minimum or maximum dose, and the approximated dose may be exceeded whenever it seems advisable.

The war against patent nostrums and proprietary preparations has continued with increasing vigor during the year. Although the articles bearing on these subjects have been extremely numerous, none of them contain anything new and are devoted mostly to emphasizing the already well-known facts.

The report of the Council on Pharmacy and Chemistry of the American Medical Association is worthy of notice in that it disclosed the fact that many of the remedies advertised under fanciful names are simply mixtures of well-known official drugs, which could as readily be prescribed by physicians and at much less cost to the patient.

In the war against the "patent nostrum" most of the credit must be given the lay journals. Following the lead of Mr. Bok, editor of the *Ladies' Home Journal*, *Collier's Weekly* has instituted a series of articles bearing on this question. The latter journal has also refused to accept any advertising matter from the patent-medicine manufacturers. If all the weekly and daily journals took a similar stand the patent-medicine evil would probably quickly cease without another word being written.

Acetanilid. Owing to the fact that many of the proprietary medicines for the relief of headaches and neuralgia contain as their principal ingredient acetanilid in varying quantities, addictions to the drug are becoming more and more frequent. Two years ago an interesting case of acetanilid poisoning was reported by Stengel and White. Recently the former has had two more cases under observation;¹ in one case addiction to the drug was brought about by a proprietary preparation; in the other the acetanilid itself had been prescribed for the relief of headaches.

D. D. Stewart² also records a case in which the acetanilid habit had

¹ Journal of the American Medical Association, July 22, 1905.

² Ibid., June 3, 1905.

been formed through the drug having been originally prescribed for nervousness and insomnia.

Stengel cites the following points of interest in these cases: first, the question of diagnosis is important, as they are not infrequently looked upon as instances of some obscure vascular disturbance; second, the denial by the patients of the use of the drug, not because of fear of the drug being withdrawn, but probably because of a moral disturbance; third, the readiness with which the neuralgic symptoms were controlled after the drug had been withdrawn. He believes that the continued use of the drug so lowers the vitality of the patient that instead of having a normal controlling influence on the neuralgia it acts as a depressant, and consequently the neuralgic symptoms occur more frequently than would otherwise be the case.

Polycythæmia, which was present in one of Stengel's cases, leads him to believe that some of the cases of chronic polycythæmia with cyanosis and enlargement of the spleen may be instances of acetanilid poisoning. A case reported by Cabot was also associated with polycythæmia.

The Council on Pharmacy and Chemistry of the American Medical Association, after an investigation of many of the common "headache" preparations, found that they contained from 43 to 76 parts of acetanilid. Clark¹ warns against the use of these proprietary preparations, which are constituted principally of acetanilid and sodium bicarbonate, as being dangerous to a lamentable extent, as soda is not a corrective of the dangers of acetanilid. While Clark believes that the value of acetanilid has been overestimated, it has four distinct therapeutic uses—viz., anodyne, antipyretic, sudorific, and slightly soporific. For *headaches* of the persistent type, such as sick, nervous, bilious, or periodic, acetanilid in 3 to 5-grain doses, combined with caffeine (1 gr.) and bicarbonate of soda (5 to 10 gr.), gives excellent results. Clark calls attention to the fact, however, that caffeine alone or one of the bromides will often produce similar good results. For *gastralgia* or acute attacks of *indigestion* acetanilid (3 to 5 gr.) and bicarbonate of soda (5 gr.) sometimes prove successful, and equally often fail. For "breaking of a cold," acetanilid (5 to 6 gr.) followed by a hot foot-bath and a draught of hot lemonade or hot whiskey is much superior to quinine, and equally efficacious as Dover's powder, without the disagreeable after-effects of the latter.

While acetanilid has the power to reduce temperature, and was much used for this purpose at one time, it is not safe for this purpose and should never be so employed. Clark speaks of its use in *influenza* because of its ability in establishing a reaction through its sudorific powers. He administers 5 to 10 gr., according to the age and conditions, every

¹ Boston Medical and Surgical Journal, November 17, 1904.

two or three hours until free perspiration is established. Should no perspiration occur after the fourth dose it is discontinued, and, when resumed, is to be repeated at longer intervals. Acetanilid is sometimes employed in small doses for the relief of the pains in influenza. I should hesitate to use it in the doses recommended by Clark, because its depressing effect is considerable; and such an effect is distinctly undesirable in influenza.

As a soporific it is of slight value, but is much less useful than the opiates. Employed externally, acetanilid acts aseptically and antiseptically. Clark claims that acetanilid is equally as efficient as iodoform, and has the additional advantage of having no odor. In the treatment of *varicose leg ulcers* it is especially useful.

Acetozone. This drug was most enthusiastically commented on two years ago in the treatment of *typhoid fever*. Llewellyn¹ has recently used the drug in typhoid fever, and although the number (18) of cases treated by him is too small to draw any far-reaching conclusions, his results are in agreement with previous observers. He administered the acetozone as follows: Thirty grains of acetozone were dissolved in three or four pints of water and administered every twenty-four hours in doses varying from a wineglassful to a half-tumblerful of water with a little lemon-juice added. Owing to the bulk of water taken the amount of milk was reduced to two pints daily, reinforced with a tablespoonful of raw beef-juice. Under its use general improvement was noted in twenty-four hours and convalescence began in all but one instance on or before the fourteenth day. The temperature began falling in thirty-six to forty-eight hours after the drug was started and usually dropped 1° a day until the normal was reached. In two instances the fall in temperature was noted as early as the twelfth hour; in one it was delayed until the fourth day.

The acetozone produced marked diuresis and quickly relieved *tympanites* if present when the drug was started; otherwise the tympanites did not develop. Hemorrhage did not occur in any of the cases, and in all of them the tongue remained moist and free from coating. As acetozone has a tendency to produce constipation, sodium sulphate was used to counteract that condition.

Used as a spray in the treatment of affections of the trachea and lower air passages, J. J. Kyle² uses acetozone in a solution of inorganic oil. The following formula is recommended:

Acetozone crystals	gr. viiss (0.5 gram).
Chloretone crystals	gr. viiss (0.5 gram).
Refined bland mineral oil	f ʒ iij (99.0 grams).

¹ Australasian Medical Gazette, February 20, 1905.

² Therapeutic Gazette, November 15, 1904.

Ford¹ has found acetozone of value in general surgery. Owing to its germicidal properties it is useful in *suppurative conditions*. Ford employs the acetozone in the same manner and in the same conditions that hydrogen peroxide is used. For the treatment of *fistulous tracts* 5 to 10 gr. of the acetozone are dissolved in 6 to 8 oz. of warm water and injected with a glass syringe. After allowing the solution to stay in contact with the tissues for a few minutes it is washed out with distilled water. Ford has also employed acetozone in an irrigating fluid, using 15 gr. to two quarts of water.

It may be noted here that *hydrogen peroxide* should never be used when the external opening of a fistula or abscess cavity is small. Under these circumstances the small opening does not allow of the free escape of the resulting chemical reaction, and the surrounding tissues are consequently subjected to marked pressure and the infection farther spread.

Adrenalin. Much of the literature on this subject has been covered by Ewart in the September number of *PROGRESSIVE MEDICINE*, pp. 84 and 90. Owing to the very extensive use of adrenalin I do not think too much publicity can be given to several facts, as there is reason to believe that more caution is needed in the administration of this substance than has hitherto been displayed. Coplin² in some experimental work with rabbits found that marked arterial degeneration was produced by repeated doses given for a long period of time in the animals from the intravenous use of adrenalin. In one of the animals a dissecting aneurysm involving the greater part of the aorta was produced. Another marked feature of these experiments was the occurrence of oedema of the lungs. Loeb stated in the discussion of Coplin's paper that he had observed similar changes. Marchand (quoted by Ewart) records similar findings as to the arteries. As was pointed out last year the dose of adrenalin is still unsettled, and nothing has appeared during the past twelve months to indicate the safe maximum dose. Therefore, in view of the experimental work so far recorded considerable caution should be exercised when giving adrenalin internally. Floersheim³ has reviewed the various uses to which adrenalin has been put and Hildebrandt⁴ has contributed an article on its application in surgery. Both these writers caution against the subcutaneous use of adrenalin even in high dilutions, because of the danger of sloughing and gangrene. According to Floersheim the hypodermic use of adrenalin is unnecessary, as a few drops placed on the tongue will produce an apparent action by the time a syringe can be gotten ready.

¹ Therapeutic Gazette, January 15, 1905.

² Proceedings of the Pathological Society of Philadelphia, May, 1905.

³ Medical News, April 1, 1905.

⁴ Berliner klin. Wochenschrift, January 2, 1905.

Kaplan¹ has obtained good results with adrenalin in *asthmatic attacks*. He does not claim to cure the disease by the use of adrenalin, but states that used hypodermically it will usually cut short an asthmatic seizure in less than five minutes. The cases most benefited are those of bronchial asthma associated with emphysema. In long-standing cases the ordinary dose is not sufficient, and as much as 25 or 30 minims must be given. Even with large doses Kaplan never noted the occurrence of glycosuria, and he believes that the contraindications to the drug are overestimated. Thrush² has reported a series of 10 *typhoid* cases in which hemorrhage occurred. He ascribes the good results obtained in these 10 cases to the use of adrenalin. The drug was administered in 20 minim doses every three hours.

Schlesinger³ reports 2 cases of *gastrointestinal hemorrhage* treated with adrenalin. In 1 case, a hæmophilic, 6 minims of a 1:1000 solution were given every hour until the bleeding ceased. In twenty-four hours this patient took 7 dr. of the solution.

It would be interesting to know the condition of the arteries in the cases reported by Thrush and Schlesinger.

Menger⁴ used adrenalin in a man bitten by a moccasin snake. The bite was on the dorsum of the right foot, and a ligature had already been applied about the ankle when Menger first saw the patient. The foot was markedly swollen, and there was in addition marked pallor and a slow, almost imperceptible pulse. Twenty-five drops of *permanganate of potash* (2 to 4 gr. to the ounce) were injected into the fang wounds, and a little later 20 drops of adrenalin (1:1000) were injected into the tissues about the wounds. A piece of cotton saturated in permanganate solution was placed over the fang wounds and the ligature loosened. The pulse improved almost at once. Two hours later 10 drops more of adrenalin were injected with $\frac{1}{4}$ gr. of morphine to secure rest. Seen the following day the man was greatly improved and there was no swelling extending upward, as usually occurs in cases not treated with adrenalin. The potash is probably responsible for the good results.

Alcohol. The true status of alcohol in medicine remains as far from being settled as ever. The vexed question as to its food value has received no light during the past year. Goddard,⁵ from experimental observations, concludes that in small doses alcohol is undoubtedly a food, but that when administered in large doses about 50 per cent. of it is excreted from the system, and that under these circumstances all of it is not a food.

¹ Medical News, May 13, 1905.

² Therapeutic Gazette, December 15, 1904.

³ American Journal of the Medical Sciences, July, 1904.

⁴ Texas Medical Journal, January, 1905.

⁵ Lancet, October 22, 1904.

Chittenden,¹ on the other hand, does not regard it as a food product in the true sense of the word. He admits, however, that when taken in moderate doses it can be oxidized in the body, and that given to a patient in whom tissue waste is excessive alcohol lends itself to the combustion processes and so saves the tissues.

Although formerly much employed in the acute infections the use of alcohol is more restricted at present. Peabody² believes that the use of alcohol is called for in cases of high, persistent temperature, with delirium, nervous prostration, with a pulse rapid and easily compressible and dicrotic or irregular. When the tongue becomes less dry, the delirium diminishes, and assimilation improves the use of the alcohol should cease.

It has long been believed that alcohol was a very potent factor in the production of *arteriosclerosis*. Cabot,³ however, from clinical and post-mortem observations, finds that this statement is greatly overestimated. He found but a small percentage of cases of *arteriosclerosis* in which the contributing factor seemed to be alcohol.

In last year's review I quoted Major Fribig's⁴ experience in regard to the use of alcohol in the tropics. His report seemed to be conclusive as to its evil effects. Within the past year, however, Woodruff,⁵ as the result of extensive observations in the Philippines, states that the use of alcohol in the tropics is necessary for the preservation of good health.

MacNicholl⁶ has examined 55,000 school children in an investigation as to the relation of heredity to mental deficiency. He found that a large proportion of children with an hereditary alcoholic taint were dullards, very deficient, or suffered from some neurosis or organic disease.

Walko⁷ recommends alcohol as a local application. Most of his patients suffered from *erysipelas*, *tuberculous peritonitis*, or *appendicitis*. He employed 50 per cent. alcohol in some cases and 96 per cent. in others. The alcohol is applied as follows: The alcohol is poured on gauze folded in eight layers. The gauze is covered with a piece of flannel and an ice-bag is placed over the flannel. A compress of 96 per cent. alcohol is well borne by the skin, but only when it is covered with flannel instead of wax-paper, as the latter excludes the air. If the skin is very tender, as in young children, thin compresses of two layers should be employed, and in every case the flannel should be covered with an ice-bag. Walko states that in addition to its pain alleviating and resorptive action the alcohol succeeded in many cases in aborting abscess formation.

¹ Medical News, April 22, 1905.

² Medical Record, March 4, 1905.

³ Journal of the American Medical Association, September 17, 1904.

⁴ PROGRESSIVE MEDICINE, December, 1904.

⁵ Medical Record, December 17, 1905.

⁶ Quarterly Journal of Inebriety, April, 1905.

⁷ Berliner klin. Wochenschrift, February 13, 1905.

Brugger¹ also speaks well of this method of using alcohol. He directs that the dressings should be kept moist, but not wet, and should be changed once in twenty-four hours.

WOOD ALCOHOL.² As formerly employed in the arts, this substance was also known as wood spirit, wood naphtha, Columbian spirit, etc. Owing to its evil odor and nauseating taste no one was able to drink it, and its use as an adulterant could easily be detected. Several years ago it was found that it could be deodorized and rectified, and dating from this discovery it has been largely used to adulterate whiskey, and other articles containing large amounts of alcohol, as flavoring extracts, tinctures, Jamaica ginger, bay rum, cologne-water, witch-hazel, as well as all kinds of official domestic and proprietary medicines. With startling rapidity there has also been an increasing number of deaths and cases of partial or complete blindness charged up to its account. In this country wood alcohol began its evil career as recently as 1896, while in Russia not a single case of death or blindness occurred from its internal use until 1904, although in the latter country its use in varnishes, for burning in spirit lamps, and for other manufacturing and household purposes was widespread.

While the evil effects of wood alcohol are most often noted after its internal use, blindness and even death may result from the inhalation of the fumes. In manufactories where this form of alcohol is extensively used it is customary to admit a great deal of fresh air into the work-rooms in order to prevent accidents.

The fatal dose of wood alcohol is probably between 4 and 8 ounces, although complete optic nerve atrophy has been known to follow the ingestion of from 2 to 5 drachms. Small amounts frequently taken are particularly dangerous, and this fact constitutes one of its greatest dangers, because preparations containing it are usually taken in much the same way as preparations of grain alcohol—i. e., in small amounts and at frequent intervals, so that it not unusually happens that a pint or even a quart has been taken and with a fatal result. A very thorough study of the literature relating to wood alcohol poisoning has been made by Buller and Wood.³

A case of complete blindness, transitory in character, due to wood alcohol, has been reported by Kaller.⁴

Three cases of *neuritis* following wood alcohol poisoning have been reported by Jelliffe.⁵ He states that he was unable to find similar cases reported in the literature.

¹ Deutsche med. Wochenschrift, February 16, 1905.

² Editorial, Journal of the American Medical Association, 1905.

³ Journal of the American Medical Association, October 22, 1904.

⁴ Medical Record, July 1, 1905.

⁵ Medical News, March 4, 1905.

Wiley¹ states that the effects produced by methyl alcohol in any of its forms are such as to justify its classification among the poisons.

Maryland has taken steps to prevent the evil by passing laws in 1904 which provide under penalty that no person, firm, or corporation engaged in making, compounding, and selling extracts, essences, or other fluids commonly used for flavoring articles of food or drink shall use or permit to be used by employees in the manufacture of such extracts, etc., any methyl or wood alcohol; nor shall any person, etc., sell or offer for sale any such extract, etc., containing any methyl or wood alcohol.

Amyl Nitrite is another drug recommended for the control of *hæmoptysis*. Francis Hare² has used the drug with alleged good results. Its good effects are ascribed to the sudden lowering of the peripheral resistance and to the reduction of the blood pressure in the pulmonary circulation. This latter phenomenon is caused indirectly by a fall in the blood pressure in the left auricle, due to diminished resistance in the aortic outflow. It is believed that the bleeding is stopped by the formation of a plug during the very sudden fall in the blood pressure.

Rand³ gave the drug a trial in *malaria*, being led to do so because of its action on the peripheral circulation. He gave a 3-minim pearl of amyl nitrite to a patient, with instructions to crush it and inhale the vapor at the onset of the expected paroxysm. This use of the drug will frequently abort the malarial seizure.

Colman⁴ used amyl nitrite successfully in a case of *menorrhagia*. When menstruation started Colman ordered the patient to bed, and when the bleeding exceeded the normal 3 minims of the drug were inhaled.

Antidiphtheritic Serum. The literature on this subject has been quite extensive during the past year, and although nothing new has appeared certain points have been emphasized and will well bear repetition. McMahon⁵ calls attention to certain points in which physicians are remiss in the treatment of diphtheria. In the first place the throat should always be examined in every case of acute illness in children. Too frequently this is neglected, and by the time the error is recognized the case may be hopeless. "Always examine the throat of a sick child, no matter what the symptoms are." A second, and even more frequent, source of error is failure to recognize the gravity of the throat symptoms. In either case valuable time is lost in the administration of the antitoxin, and in addition others are needlessly exposed to the dangers of diphtheria. Much trouble would be avoided if the following rules were observed: 1. In every case in which there is a suspicion of diph-

¹ New York Medical Journal, November 26, 1904.

² Lancet, October 1, 1904.

³ American Medicine, April 29, 1905.

⁴ Scottish Medical and Surgical Journal, 1905.

⁵ Canadian Practitioner and Review, 1904.

theria, give antitoxin at once and freely. 2. Get a report in every doubtful case, but do not wait for the report; inject at once. 3. If the bacteriological examination shows the presence of diphtheria bacilli, give an injection to all children to prevent spread of the infection. Every physician takes pride in the correctness of his diagnoses, but in throat conditions the danger of being too sure are so serious that it is much better to always take the safe side and give antitoxin. I believe that the mortality of diphtheria would be considerably reduced if the term "tonsillitis" were entirely dispensed with.

Nash¹ also calls attention to the importance of treating all suspicious cases as though they were undoubtedly diphtheria. As he states, it is impossible always to diagnose correctly diphtheria in its early stages; other throat conditions, particularly follicular tonsillitis, simulate it in many respects so closely that without a careful bacteriological examination it is extremely difficult to differentiate between diphtheria and several conditions affecting the tonsils. Furthermore, it is not always possible to obtain a competent bacteriological report. This is especially true of those practising in the country or in small communities. And even where the facilities are at hand twelve to twenty hours must elapse before a report can be obtained, and thus valuable time is lost if the report comes back positive. In case a negative report is returned no harm has been done by the administration of antitoxin. If the case is properly explained to the family there need never be any trouble on the score of expense or inconvenience.

Royer² has recently contributed a most excellent study on the antitoxin treatment of diphtheria, with a plea for rational dosage in treatment and immunizing. In addition to extensive statistics bearing on the mortality of diphtheria before and since the introduction of antitoxin, Royer also gives data in reference to the day on which the antitoxin was administered. The figures quoted by Royer bear out the well-known fact that the mortality in diphtheria increases in direct proportion to the time which elapses between the first evidence of the disease and the giving of the antitoxin. "Experience has taught me that the golden time for administering antitoxin is during the first twenty-four hours of an attack of diphtheria. I have yet to see a patient die from diphtheria who had antitoxin in sufficiently large doses within twenty-four hours of the commencement of the attack."³

In regard to the much-discussed question of dosage Royer gives the following doses in use in the Philadelphia Municipal Hospital: Purely tonsillar exudate (single), 2500 units; purely tonsillar exudate (double),

¹ Practitioner, April, 1905.

² Therapeutic Gazette, April, 1905.

³ J. H. McCollom, quoted by Royer.

5000 units; tonsillar exudate with involvement of pillars and uvula or pharynx, 7500 to 10,000 units; nasal and any other part involved, 7500 to 10,000 units; laryngeal, 7500 to 10,000 units. The dose is repeated in each case in from twelve to twenty-four hours, depending on the severity of the disease and the signs of improvement, as shown by the general condition and disappearance of the exudate. "If the exudate is rapidly separating, do not give a second dose; where a great amount of exudate remains, give a daily dose of from 5000 to 7500 units until the greater portion has disappeared. With patients admitted after the seventh day of the disease, give 2500 units only. Do not repeat." The extremely large doses in the nasopharyngeal cases are given because the lymphatic supply of this locality is particularly rich.

Royer states that experience at the Municipal Hospital shows that antitoxin is little used as an immunizing agent. He states that it is no uncommon experience to receive a patient ill with diphtheria and in from two to three days receive a second or third case from the same house. If immunizing doses were used much needless suffering and distress would be avoided. He further states that they often have mothers accompany their sick babies and live in the acute wards with them; or mothers, ill themselves, bring with them nursing babies not suffering from the disease; no precaution is taken and no treatment given aside from immunizing doses of the antitoxin. These patients are not expected to get the disease and are practically assured that they cannot get it if immunized.

For purposes of immunization Royer recommends the following doses: 500 units for those not directly exposed, 1000 units for those directly exposed, and 1500 units if any sign of illness is present. He states that he has not yet seen a case of diphtheria develop where a patient had been immunized at the time of exposure or soon after.

Fischer¹ is a strong advocate of large doses of antitoxin. He points out that when large doses of antitoxin are employed the mortality is always lower than when small doses are used. The doses employed by Fischer are similar to those in use at the Philadelphia Municipal Hospital.

Hare² in an editorial on the efficient dose of diphtheria antitoxin states that it cannot be measured in cubic centimetres or units, but it must be given for the effect, regardless of the dose. It is also pointed out that children do not require smaller doses than adults, but, on the contrary, often require larger doses, as they are more susceptible to the infection. As an illustration of the enormous amounts of antitoxin which may be given, Hare quotes the report of a case by Dr. Sutherlin in

¹ New York Medical Journal, June 17, 1905.

² Therapeutic Gazette, March 15, 1905.

which he gave a woman aged twenty-six years no less than 498,000 units. For three consecutive days she was given 32,000 units daily, or 96,000 altogether. The case is cited as an illustration of the fact that large doses are often required in virulent infections, and also because it serves to show that the serum is harmless even when enormous doses are given.

I think the recent tendency in regard to all the sera is toward their employment as a prophylactic rather than as curative agents. This is notably the case with antitetanus serum. Wesener¹ gives his experience with antitoxin as a prophylactic in nearly 250 cases. Only 4 of the children thus protected contracted the disease; in 3 it developed within forty-eight hours after the injection, showing that it must have been already present. In the fourth case the symptoms and signs were so slight that the diagnosis could not have been made without a bacteriological examination. In his experience the immunity thus conferred lasts from three to four weeks and is not absolute. Wesener gave very small children 200 units and the larger ones from 300 to 400 units. Ibrahim² also speaks strongly in favor of immunizing doses of antitoxin in individuals exposed to diphtheria. He found that the immunity thus given lasted three weeks without fail. A dose of 250 to 300 units was found effectual, but in children already suffering from scarlet fever, whooping-cough, or measles 500 units should be given. Inasmuch as age has nothing to do with the size of the dose, and it has been repeatedly shown that the serum is perfectly harmless, the doses recommended by Royer³ had better be employed. Doubtless Wesener would have obtained absolute immunity in all of his cases had he employed larger doses.

The intravenous administration of diphtheria antitoxin was first suggested by Cairns two years ago, when he reported 20 cases treated in this manner. The method has also been tried in a few cases at the Philadelphia Municipal Hospital. Biernacki and Muir⁴ have treated 38 cases in nine months by means of intravenous injections. Although they had a mortality of but 3 out of 38 severe cases, they are in doubt as to the advantage of this method because there had been a diminution in the death rate of diphtheria under their care. The intravenous dose employed by Biernacki and Muir was 20,000 units.

Antitoxin Rashes. Sutcliffe⁵ has made a study of 123 rashes occurring in a series of 630 cases of diphtheria. He found that the eruption might be macular, urticarial, maculopapular, scarlatinal, or consist of large, blotchy, slightly elevated areas, and that it had a tendency to change

¹ Münchener med. Wochenschrift, March 21, 1905.

² Abst. Journal of the American Medical Association, April 29, 1905.

³ Loc. cit.

⁴ Lancet, December 24, 1904.

⁵ Therapeutic Gazette, February 15, 1905.

in appearance from hour to hour. An important point in regard to these rashes is the presence in nearly all cases of an urticarial element, although it may be very slight and in some instances itching is scarcely noticed. The time of its appearance after the antitoxin injection ranges from a few hours to three weeks or even longer. Preceding the appearance of the eruption there is an elevation of temperature ranging from 100° to even 105°; joint pains and itching of varying intensity may also be present. It was noted that blondes seemed more subject to the rashes than brunettes, and that the rashes in the former assumed a more severe character than in the latter. When the rash assumes a measly type it is to be distinguished from measles by the absence of catarrhal symptoms, Koplik's spots, photophobia, etc. When it is scarlatinal in type the confusion is greater as the resemblance is pronounced, and in addition the association of scarlet fever and diphtheria is not an uncommon one. The absence of vomiting, of the red tongue with enlarged papillæ, of glandular enlargement with tenderness, of circumoral pallor, and the presence of urticaria and lack of the distinct punctate appearance seen in scarlet fever usually suffice to distinguish the two conditions.

Roehr¹ states that the urticaria, œdema, or arthritis following injections of antitoxin may be prevented by large doses of *potassium acetate* well diluted, and securing free action of the bowels. According to the amount of antitoxin used, 5 to 30 gr. of potassium acetate in a glass of water are given every hour for two to six days or longer. He also states that the disagreeable symptoms may be avoided by small but repeated doses, but that this is possible only when the patient is under constant supervision, and even then is dangerous in infants or laryngeal cases.

Roehr explains the benefits from potassium acetate on the ground that it favors elimination already overtaxed by the foreign serum. An editorial in the *Medical News* (June 10, 1905) suggests that the untoward effects of the antitoxin are produced by the formation of precipitins and that the precipitins cause minute emboli which occlude the capillaries. Experimental work would seem to show that the untoward effects of antitoxin are in some way related to the formation of precipitins, but, as the editorial states, it is difficult to understand why these symptoms, if due to embolism, are of such an evanescent nature.

A recent method of treating *cerebrospinal meningitis* is by massive doses of diphtheria antitoxin. At present the treatment is on trial, and while several observers have reported favorably on its use others are skeptical as to its value. The method was originally introduced by Arthur J. Wolff.

¹ Chicago Medical Recorder, January 15, 1905.

Waitzfelder¹ reports on 17 cases treated during a period of five weeks. Of this number 5 recovered completely, 3 died, and 9 were under treatment at the time of writing. Of the 9 cases still under treatment 5 showed marked improvement and gave promise of recovering; in the remaining 4 the condition was serious. Hare² was impressed favorably with the treatment in a single instance in which he used it. The case was of the fulminating type, and although it terminated fatally the delirium, muscular rigidity, and restlessness showed marked improvement after the administration of the antitoxin. Death resulted from cardiac failure.

Peabody,³ who used the treatment in 22 cases of cerebrospinal meningitis, states that he could not see any influence for good or evil from the use of diphtheria antitoxin.

Rosenberger⁴ and Pennington,⁵ considering the antitoxin treatment of cerebrospinal meningitis purely from a laboratory standpoint, are not disposed to consider it favorably. As Rosenberger says, if cerebrospinal meningitis is due to a specific bacterium (meningococcus of Weichselbaum) then a specific serum, an antitoxic or antimicrobic one, should be used in the treatment of the malady. He further calls attention to the fact that when the toxin of the diphtheria bacillus is diffused through the system (if the latter is at par) there is a combination of the toxin with a suitable receptor, and this union brings about the formation of the immune body. If there is no suitable receptor present, then no chemical reaction takes place because the receptor must have some assimilable foodstuff—*i. e.*, toxin. As each toxin according to Ehrlich's theory has its own receptor, it is obvious that the toxin elaborated by the meningococcus of Weichselbaum cannot form a combination with the receptor of the diphtheria toxin. Hamilton⁶ says that against other organisms diphtheria antitoxin is neither protective nor curative, and, furthermore, that it is distinctly deleterious, as animals so treated die sooner than those without antitoxin. The dose of diphtheria antitoxin when employed in the treatment of meningitis is from 10,000 to 15,000 units.

In spite of these theoretical objections to the use of diphtheria antitoxin it has within the past few years been used in a variety of affections, with alleged good results. Within the past year it has been recommended by Rowland⁷ in the treatment of *hay fever*; by Legg⁸ for *goitre*, and by Passalacqua⁹ in the treatment of *whooping-cough*. None of these

¹ Medical Record, March 11, 1905.

² Therapeutic Gazette, May 15, 1905.

³ Medical Record, May 13, 1905.

⁴ Therapeutic Gazette, June 15, 1905.

⁵ Ibid.

⁶ Quoted by Pennington.

⁷ American Medicine, December 17, 1904.

⁸ Journal of the American Medical Association, April 22, 1905.

⁹ Revue française de médecine et de chirurgie, March 13, 1905.

observers give any explanation of why the antitoxin did good in these diseases.

Antipneumonic Serum. The status of this serum is as yet in an unsettled state and a definite opinion as to its value cannot be expressed. Pässler¹ used a serum made from several species of pneumococci. He claims that the pneumonic attack was appreciably shortened, the temperature in many cases reduced, and the tendency of the disease to spread to neighboring lobes was less than usual. Furthermore, the general condition of the patients improved and complications were rare. De Renzi² gives a favorable opinion of Pane's serum, which he used in 26 cases of pneumonia. According to this observer the general condition of the patient improves after the first injection, the temperature is reduced, the pulse and respirations decrease in number, and vascular pressure is lowered for a few days. No effect on the local condition in the lung was noted. The other side of the case is given by Anders,³ who concludes from a study of the literature that:

1. A sufficiently extensive trial of the antipneumococcal sera has been made to determine with a reasonable degree of accuracy their efficiency, and the results, as a whole, fail to carry conviction.

2. An efficient serum, or one that will cut short the pneumonic process, is yet to be produced, although according to some clinicians the sera available at present have a restricted field of usefulness.

3. Recent observers have employed the serum in massive doses from the commencement of the disease without gratifying results.

4. The practical results of the use of antipneumococcus serum, as shown by the very slight reduction in the mortality percentage, does not warrant its general introduction.

5. The sera thus far found possess no antitoxic qualities, and their supposed anti-infectious properties have not been proven.

6. Further investigations into the subject with a view to discovering an efficacious serum are to be strongly advised and encouraged.

Castresana⁴ is of the opinion that fully 95 per cent. of *corneal ulcers* are the work of the pneumococcus. On this assumption he has been treating ulcers of this class with antipneumococcus serum and claims that a majority of them were promptly cured. The serum was injected under the conjunctiva and also instilled every four hours, supplemented by the usual measures.

Antirabic Serum. In spite of the fact that *hydrophobia* has been known to be a preventable disease for many years, the belief in the necessity of

¹ Deutsches Archiv f. klin. Medizin, 1905, Nos. 3, 4.

² La Riforma Médica, 1904; abst. Journ. Amer. Med. Assoc., 1905.

³ Journal of the American Medical Association, December 10, 1904.

⁴ Siglo Medico, January 7, 1905; Journal of the American Medical Association, June 10, 1905.

having the prophylactic treatment carried out at an institute, often situated at a great distance from the patient's home, and not infrequently entailing great expense, has in many instances prevented the employment of this procedure. That this is not necessary is shown by two cases reported by M. Solis-Cohen,¹ who carried out successfully the treatment in the patients' homes.

The Pasteur Institute of the Department of Health in New York will arrange for a course of treatment for the individual case on receipt of the following information: 1. Name and age of the patient. 2. Location of bite, date, and severity of bite, with its treatment. 3. Any information bearing on the diagnosis of the animal inflicting the bite. They also require a brief report on the patient's condition two weeks after the end of the treatment. If no symptoms have developed two weeks after the cessation of all treatment the patient is considered out of danger.

Angny in discussing Cohen's paper stated that he had also administered the Pasteur treatment in a patient's home.

Antistreptococcus Serum. Reports on the curative effects of this serum have been most favorable during the past year. Wolff² believes that the best chance of success with the bactericidal sera are from the standpoint of prevention, and that this is particularly true of antistreptococcus serum. In Wolff's opinion antistreptococcus serum should be given during the stage of incubation or when a general streptococcus infection is feared, as after abortion, severe deliveries, etc. This statement is of interest when we call to mind that after years of failure as a curative agent it is in the matter of prevention that tetanus antitoxin has finally proved so successful.

Meyer³ advocates the securing of an antistreptococcus serum which has been properly standardized. He believes that it should be tested by an expert with a streptococcic culture from human infection in an unchanged state. He furthermore cautions against its use when any of the organs are seriously involved, as harm may be done. This is especially true of acute rheumatism and the malignant form of endocarditis. Meyer obtained his best results with antistreptococcus serum in acute throat affections, where its effect was very marked, and in *diphtheria*, where streptococcic serum was added to the diphtheritic. He also noted improvement in cases of *puerperal sepsis* if the infection had not become systemic.

Foulerton⁴ advises large doses of antistreptococcus serum, as he believes the action of the serum is purely antitoxic and that the infecting bacteria remain unaffected by the serum and continue to manufacture their

¹ Proceedings of the Philadelphia County Medical Society, March 31, 1905.

² Berliner klin. Wochenschrift, 1904, Nos. 42-44. ³ Ibid., February 20, 1905.

⁴ Lancet, December 31, 1904.

specific toxins. In order to neutralize these toxins which are being continually thrown into the patient's circulation repeated doses of the serum must be given. Foulerton begins treatment with an injection of at least 20 c.c. of the serum and repeats this dose, if necessary, at least once every twenty-four hours. If no improvement is noted after two doses of 20 c.c. each given within twelve hours, it is useless to continue administering it. He does not believe that the toxic symptoms following the use of a serum are of any particular consequence. At any rate, whatever the dangers of large doses may be they are necessary for the successful treatment of streptococcic infection. A dose of 5 c.c. is useless and will doubtless result in failure.

Bumm¹ gives the results obtained in 67 cases of *postpartum infection* treated by antistreptococcus serum. The series gave a mortality of 11 per cent., and included all types and degrees of puerperal infection.

Once the infection has spread beyond its original site and septic complications are produced, no serum so far devised is available to effect a cure, no matter how large the dosage employed. When the streptococci are localized in the endometrium or but sparingly present in the blood, Bumm thinks the serum is likely to act favorably. In his experience the earlier the serum is resorted to, the better are the results.

Rose² gives his experience with one case of severe streptococcus infection, in which recovery seemed undoubtedly due to the serum.

Cressy³ reports a case of sepsis developing after injury to the great toe. On the eighth day of the disease 20 c.c. of antistreptococcus serum was given; within an hour the temperature had dropped 3.5°. During the acuteness of the attack the serum was used in 10 c.c. doses daily. Although the case was complicated by the formation of superficial abscesses, pneumonia, and an empyema, convalescence was rapid and uneventful.

Anderson⁴ reports 2 successful cases. In his opinion the serum should be as fresh as possible and injected at the earliest possible moment before much toxin has formed. He further states that in those cases in which the serum is doing good there is no danger of administering it in an excess, and even in cases where it does no good there is no evidence to show that the serum does harm. Anderson advises the administration of the serum for some time after apparent recovery, as its action depends mainly on increasing phagocytosis rather than the formation of an antidote.

Ayer⁵ has reported a series of 15 cases of *erysipelas* treated by injections of antistreptococcus serum. He states that the immediate beneficial effects of the injection of 10 c.c. to 20 c.c. of serum are often striking,

¹ Berliner klin. Wochenschrift, October 31, 1904.

² Lancet, December 31, 1904.

³ Ibid., October 29, 1904.

⁴ Ibid., February 25, 1905.

⁵ Medical Record, March 4, 1905.

although not uniformly so. In favorable cases the patient's general condition is often improved at the end of a few hours. The temperature comes down suddenly; the pain and burning are diminished; restlessness disappears, and the patient often falls into a quiet sleep, from which he awakes free from any distressing symptoms. In addition, the amelioration of the constitutional symptoms there is also a decrease in the violence of the local conditions. Shortly after the first injection the swelling becomes less marked and desquamation begins so be apparent. Ayer states that the deleterious effects of the serum are so mild as to be of no consequence. His conclusions are as follows; 1. That the administration of antistreptococcus serum shortens considerably the course of an uncomplicated attack of erysipelas. 2. That it tends to inhibit extension of the disease. 3. That it has a strikingly beneficial effect upon the general condition of the patient, reducing the temperature, pain, and discomfort incidental to the disease. 4. That it rapidly reduces the pathological leukocytosis. 5. That it prevents or suppresses febrile albuminuria. 6. That its use is attended with no danger, even in large doses. 7. That the only disagreeable symptom referable to the serum observed by the writer is a transient eruption which occasionally occurs at the site of the injection. 8. That the efficacy of the serum treatment is in direct ratio to the length of time which has elapsed between the onset of the disease and the first injection of serum.

Recently, Ayer¹ has reported 33 additional cases of erysipelas in which he has used the serum. He repeats his belief in the efficiency of the treatment. Ayer states that it is useless to administer the serum after the third day of the disease, but given on or before that time it will shorten the attack very markedly. In this last series the average duration of the disease was shortened 2.6 days.

Grizone² believes that the serum treatment of erysipelas is the rational one. Failure from its use he ascribes to using the serum too late or in insufficient doses. He claims to have obtained remarkable results in a case of marked severity complicated by otitis media and meningitic symptoms.

Meyer,³ who is favorable to its use, states that he did not obtain any results in cases of erysipelas or scarlet fever.

Hamilton⁴ is impressed with the action of antistreptococcus serum in conditions produced solely or in part large by the streptococcus. In his experience his results have been even more gratifying in scarlet fever than in puerperal sepsis. In an experience of about 50 cases of *scarlet fever*, he did not lose a case in which the serum was used from the begin-

¹ Medical Record, August 26, 1905.

² Giornale medico del Regio Esercito; Medical Record, December 24, 1904.

³ Loc. cit.

⁴ American Journal of Obstetrics, November, 1905.

ning. He advocates the early administration of the serum in quantities sufficient to produce a noticeable change in twelve hours, and the repetition of it as often as indications demand. He administers 30 c.c. at the first dose and repeats it in twelve hours at the farthest. This dosage is kept up until benefit is obtained, when the dose is gradually diminished. Hamilton states that the use of the serum in no way interferes with any other treatment, such as stimulation and the treatment of any particular symptom. While it may be used in mixed infection as an aid to other methods, its success is not so marked.

Shaw¹ describes the method of preparing the Moser serum and gives the results obtained in *scarlet fever* during the past four years at the Annakinderspital in Vienna. The serum is usually employed in only the severe cases with symptoms of general intoxication and in lethal cases. It is injected subcutaneously in the abdomen. The dose employed is 200 c.c. Within a few hours results from the serum are noticed. The fever falls to normal without any sign of collapse or sweating, the pulse rate diminishes, and its quality is improved. There is also a noticeable improvement in the nervous symptoms. Since the introduction of the serum sequelæ and complications have been less frequent, and when they do occur are less severe. Shaw states that mortality from scarlet fever in the Annakinderspital for the four years preceding the use of antistreptococcic serum averaged 14.5 per cent., and for the four years since its employment it has averaged 8 per cent. During this latter period the mortality from scarlet fever in other hospitals of Vienna has averaged 13.1 per cent. In common with other observers Shaw states that there is no danger in employing the serum, as the only unpleasant result is the production of an exanthem which may make the children uncomfortable.

Spencer² has successfully employed antistreptococcus serum in a case of *infectious endocarditis* and *pericarditis* occurring during convalescence from scarlet fever. He urges the early employment of the serum in doses regulated not by the age of the patient, but by the severity of the condition.

Walker³ is also in accord with the prevailing opinions as regards antistreptococcus serum. He believes that strikingly beneficial results can be obtained from the use of the serum, especially if used sufficiently early and in large enough doses. He advises the use of a recently prepared serum of the "compound" variety.

Antityphoid Serum, either as a protective or curative agent, has for some reason received but little attention in this country. This is rather surprising in view of the favorable reports as to the efficiency of the serum.

¹ Medical News, October 29, 1904.

² Lancet, February 18, 1905.

³ Ibid., December 31, 1904.

Chantemesse,¹ who published his first paper in 1897, has recently given the results obtained with his serum under uniform conditions for three and a half years. This series numbered 765, of which 545 were treated by himself and the remaining 220 by Josias and Brunon. The mortality in this series was 4 per cent., while the average mortality of the other Paris hospitals during the same time averaged 18 per cent., the lowest being 12.8 per cent. Perforation occurred in 1.6 per cent., as against 2.6 per cent. in 8160 cases of other statistics. Chantemesse urges that the serum be injected early. No case of perforation occurred when the serum was injected prior to the seventh day. It is claimed that while the serum strengthens the defensive processes in the spleen, glands, and bone-marrow it requires the co-operation of the organism to cure.

The principles of administration are directly opposite to those employed with antidipteritic serum. With the latter the longer the duration of the disease and the more severe the symptoms the larger the dose; with antityphoid serum, however, the sicker the patient the smaller the doses should be. Chantemesse obtains his serum by injecting horses with soluble typhoid toxin.

Chantemesse's critics have claimed that his good results were obtained because of his personal care of his patients and to the use of the cold baths. As he states, however, others have obtained equally good results, and hospitals in which the cold bath is used extensively have had a uniformly higher mortality than his.

The results of the first work in this country on the production of an antityphoid serum have recently been published by Stokes and Fulton.² They obtained the serum from the hog and found both clinically and from laboratory experiments that this serum was not hæmolytic for human blood. The serum was used in 23 cases, 21 of which recovered. Of the 21 cases in which recovery took place, the authors believe that the serum contributed to the favorable result in 15; of the remaining 6 no effect, either for good or for evil, could be observed.

Smith,³ who has made a careful study of the subject of antityphoid inoculation, believes that it has a distinct practical value to any community in which typhoid breaks out in an epidemic form or to those who have much to do with typhoid patients, and that it might be used with advantage among newcomers in certain endemic areas, such as some Indian stations and Malta. The inoculation, to obtain its fullest measure of protection, should be made at least two months before exposure to infection; this protection is extended for some years. Smith states that even

¹ Presse médicale, 1904, No. 86.

² Journal of the American Medical Association, May 13, 1905.

³ Journal of Tropical Medicine, September 1, 1904.

when the inoculation is made shortly before exposure, the procedure is beneficial.

Bruce,¹ who was detailed to prepare a report on the results of Wright's antityphoid serum, gave an unfavorable reply. While he believes that the future of antityphoid inoculation is not particularly bright, the importance of the subject is so great in its possibilities when further developed that its study should be persevered in.

Ewing,² who has reviewed the entire subject of immunity in typhoid fever, is extremely skeptical about the various sera which have been employed. He states that it is becoming more apparent that the value of a bactericidal serum in well-established typhoid fever must be very doubtful, and that while such sera are curative in inoculated rabbits, it must be remembered that the animals do not have typhoid fever. He furthermore states that while such sera may be effective in the early stages of the disease, it is difficult to see how they can be otherwise than dangerous in the later stages of the disease, when the bactericidal power is commonly high and the organism is suffering from an excess of poisoning.

Wright's method of prevention, Ewing believes, has a much better theoretical basis.

Antitetanic Serum. As a prophylactic agent antitetanic serum now rests on a firm basis and its use as such is becoming more and more general. It is now the rule in the Surgical Dispensary of the Johns Hopkins Hospital to give all patients who have received punctured wounds or who have wounds of any description in which there is a possible danger of tetanus developing, an immunizing dose of antitetanic serum. There is little doubt but what this same procedure will be adopted in all surgical dispensaries and in private practice. Much credit is due the *Journal of the American Medical Association* for the publicity which it has given this subject. One year ago before the Fourth of July this journal published a special article giving in detail the methods to be adopted in case of Fourth of July injuries or those of a similar nature. The directions were given *in extenso* in last year's *PROGRESSIVE MEDICINE*, December, 1904, p. 302. The same journal, July 17, 1905, in an editorial, gives the following interesting and important facts: "Last year we received on a grand scale a demonstration of the efficiency of tetanus antitoxin as a prophylactic. Previously there had been several instances of the checking of hospital epidemics, or of stable epidemics among horses by this means, but there has probably never been so large an experiment performed as this. That it was successful the figures prove beyond a doubt. We have yet to hear of a single instance in which

¹ Journal of the Royal Army Medical Corps, February, 1905.

² Proceedings of the Pathological Society of Philadelphia, 1905, No. 3.

a patient with a blank cartridge wound who received a prophylactic injection of antitoxin later developed tetanus, although there were instances enough of such wounds not so treated that were followed by tetanus.

"As a prophylactic dose, from 5 to 10 c.c., injected subcutaneously, preferably in the vicinity of the wound, is sufficient; the amount depending on the age of the patient, although there seems to be no danger from large quantities. If this is done universally, we may confidently expect to see the great saving of life recorded last year repeated and increased this year, with the deaths from tetanus practically limited to those whose wounds did not receive medical attention until symptoms of the disease had already appeared."

Alexander¹ and Suter² have reported cases in which immunizing doses of antitetanic serum was successful. Suter urges the employment of the serum in individuals having wounds that threaten tetanus.

Anders and Morgan,³ in a statistical study of tetanus, found that as a means of prophylaxis the serum has been fully tested, both in America and abroad, and there is uniform agreement that antitoxin does protect in every case.

They quote Scherck as follows: "In 1903 there were 56 cases of Fourth of July injuries treated, with 16 deaths from tetanus resulting; in 1904, 37 accident cases were treated, every one of which was given prophylactic injections of serum, with the result that no cases of tetanus developed."

Although it is the belief of Anders and Morgan that the antitoxin has no appreciable beneficial effect after the disease has become established, either in reducing the mortality or hastening recovery, a number of cures, due to antitoxin, have been recently reported by Booth⁴ (3 cases), Montgomery⁵ (1 case), Neordeir⁶ (1 case), and Davidson⁷ (1 case). Collins⁸ reports a case of tetanus in which antitetanic serum and chloral and bromide produced no improvement. He then used, in addition to the above-mentioned remedies, *curare*. The *curare* should be given hypodermically, starting with $\frac{1}{4}$ gr., and increasing the dose according to the severity of the spasms. Collins does not believe that *curare* has any specific effect on the tetanus toxin, but that it has some influence in diminishing the severity of the clonic spasm by paralyzing the nerve endings.

¹ Medical and Surgical Monitor, 1904.

² Archiv f. klin. Chirurgie, 1905, No. 1.

³ Journal of the American Medical Association, July 29, 1905.

⁴ Ibid., July 1, 1905.

⁵ Medical Standard, November, 1904.

⁶ Journal of the American Medical Association, September 17, 1904.

⁷ American Medicine, August 5, 1905.

⁸ Lancet, April 15, 1905.

Hopkins¹ reports 2 cases of tetanus successfully treated by intracerebral injections of antitetanic serum.

Rogers,² who has previously written on the subject of intraneural and intraspinal injections of antitoxin for the treatment of tetanus, has recently contributed another article on the subject. His advocacy of this means of treating tetanus is based on very convincing experimental work, an account of which he gives in detail. As a result of the experiments of Marie and Morax, and later Meyer and Ransom, it has been shown that wherever in the body the tetanus toxin is injected, some of it diffuses through the tissues to the neighboring end-apparatus of the motor nerves; the rest of the toxin passes into the lymphatics, thence into the general circulation, and from there to the capillaries, where it is brought into contact with all the other motor nerve end-apparatus. The toxin then enters the axis-cylinders of the motor nerves and is transmitted to the spinal ganglia. Even when the toxin is injected into the subarachnoid space, providing there is no injury to the nervous tissue, it is taken up by the lymphatics and is transferred in the manner above described to the spinal ganglia. The sensory nerves cannot take up the poison, and play no part in the process.

Rogers asserts that after tetanus has become manifest it is practically useless to give antitoxin subcutaneously, as it is slowly absorbed and rapidly excreted or destroyed; the toxin, on the other hand, is rapidly taken up by the motor nerves, where it is out of reach of the antitoxin. Under a general anæsthetic, preferably chloroform, the motor nerves which supply the region primarily affected should be exposed as high up as near the cord as possible and injected, by means of a fine hypodermic syringe, with 5, 10, or 20 minims of antitoxin. Inasmuch as some one of the extremities is the point usually involved, the nerve trunks in the axilla or the thighs (anterior crural or sciatic nerves) must be exposed and injected. Furthermore, as some of the poison also gains access to the ganglia through other motor nerves, this lesser charge must be blocked by direct injection of the spinal cord itself. In order to be effective, the injection into the cord should be as near the medulla as possible, particularly in those cases in which cyanosis is present and there is imminent danger of death through involvement of the vital centres of respiration and circulation. The effects of the toxin can still further be neutralized by injection of antitoxin directly into a vein. Under the proper precautions 10 to 20 c.c. may be given in this way. Rogers gives in detail an account of the symptoms and treatment pursued in 7 cases of tetanus. Of this number, 4 recovered; of the 3 deaths, 2 were due to an apparently over-

¹ Medical News, October 10, 1904.

² Journal of the American Medical Association, July 1, 1905.

whelming infection, and the third, he thinks, would have recovered had not diphtheria antitoxin been given by mistake at a critical period in the disease.

Schley¹ records one case of acute tetanus in which the intraneural and intraspinal injection of antitoxin were successful.

Antithyroidin. The treatment of conditions resulting from defective thyroid secretion, as myxœdema and cretinism, by the use of extract of the thyroid gland, is one of the greatest triumphs of modern therapeutics. So far, however, the treatment of exophthalmic goitre, which is the result of hypersecretion, has not been particularly successful, as the removal or partial removal of the gland is an operation of considerable magnitude and does not always lead to permanent improvement. Sera have been obtained and used, with not very satisfactory results. Lademann,² who has reviewed the various methods used in the treatment of *Graves' disease*, believes that the method proposed by Lanz in 1894 is the best. The latter fed individuals suffering from exophthalmic goitre with the milk of thyroidectomized goats. Lademann suggests the use of desiccated thyroidectomized milk in the form of tablets.

Antituberculous Serum. Marmorek's serum has received considerable notice during the past year and there is a disposition to view it much more favorably than when it first came out. The first reports, made by French physicians, condemned it, but following these reports Latham³ and Richer⁴ commented most favorably.

Recently, Richer⁵ read a paper at the first meeting of the National Association for the Study and Prevention of Tuberculosis, in which he was most enthusiastic over Marmorek's serum. Some of the patients originally reported on in September, 1904, kept up their improved condition. Since that time he has been using the serum in the treatment of incipient pulmonary tuberculosis with uniformly good results. In some instances improvement was marked within forty-eight hours, with corresponding modifications in the physical signs, and in no instance was there an untoward symptom. Richer's technique is as follows: 10 c.c. are injected during the course of three days, 2 c.c. the first day, and 4 c.c. on each of the other days. A period of rest then follows, lasting at least ten days and sometimes fifteen days; he then proceeds as before until 50 c.c. have been injected. If, after an examination, the condition of the patient is good, Richer believes it is advisable to continue the inoculations every month, one of 50 c.c. being given for four or five months, in order to keep up the passive immunity conferred by the serum. He does not think it

¹ Medical Record, October 15, 1904.

² American Medicine, November 19, 1904.

³ Lancet, April 9, 1904.

⁴ Montreal Medical Journal, September, 1904.

⁵ New York Medical Journal, June 10, 1905.

wise to use the serum in the last stages of tuberculosis because of possible injurious effects.

That Marmorek's serum has not received fair treatment is also the opinion of Frey.¹ He believes the serum has been overhastily condemned and that it is well worthy of an extended and impartial trial. In an experience covering over 350 injections, he observed urticaria in a few instances. Frey recommends that the injections be frequently interrupted by intervals of rest; itching, urticaria, or redness about the site of injection also call for a few days' cessation of the treatment. Temperature, purely tuberculous in character, was favorably influenced; toxic dyspnoea and diuresis were improved, and the expectoration, while at first increased, then diminished in amount.

Klein and Jacobsohn,² in their comments on Marmorek's serum, state that nothing is more natural than untoward effects from a serum. The accidents they noted were slight rise in temperature, urticaria, erythema, and arthralgias. Occasionally, weakness, loss of appetite, and general fatigue were complained of by patients. None of these symptoms mean anything, but their presence is an indication to diminish the dose or make the periods between doses longer.

The two most prominent serums for the treatment of tuberculosis now before the profession are Maragliano's and Marmorek's.³ Maragliano's serum is produced from the cow. He injects the animals with an aqueous extract of virulent but dead bacilli, supplemented by the filtrate of a young culture. By this method he claims to obtain the full value of the bacillary bodies and toxins. Marmorek obtains a virulent culture of tubercle bacilli by growing them in a combination of leukotoxic serum (prepared by immunizing calves against guinea-pigs' leukocytes by peritoneal injections) and a bouillon extract of liver tissue. Filtrates of these cultures are then injected into horses.

Friedman⁴ has produced a serum by injecting a cow with tubercle bacilli from the tuberculous lung of a turtle. He has found this serum effective in animals, and hopes to produce an antituberculous serum of great clinical value.

Apomorphine. Tull⁵ reports remarkable results from the use of apomorphine in a case of *chorea*. A child, aged fifteen years, failed to improve under the usual remedies. A single hypodermic of $\frac{1}{40}$ grain of apomorphine caused a cessation of the movements and the child slept quietly. Tull then ordered $\frac{1}{40}$ grain of apomorphine by mouth every three hours

¹ Münchener med. Wochenschrift, November, 1904.

² Bulletin général thérapeutique, July 30, 1904.

³ PROGRESSIVE MEDICINE, September, 1904, p. 304.

⁴ Deutsche med. Wochenschrift; Journal of the American Medical Association, January 14, 1905, p. 131.

⁵ New York Medical Journal, March 11, 1905.

and continued the use of arsenic. The child made an uneventful recovery, and at no time during the administration of the apomorphine was there any nausea or vomiting.

Arsenic. Alexander¹ has reported great improvement in a case of *arthritis deformans* from the use of arsenic for a long period of time. The drug was administered in the form of liquor potassii arsenitis for nearly two years. Because of suffusion of the conjunctiva, puffiness of the eyelids, nausea, and a tendency to diarrhoea the dose could not be increased beyond 16 drops three times a day. It is of interest to note that in this case no great degree of tolerance for the drug was obtained. Alexander also discusses the various untoward results which may arise from the prolonged use of arsenic, as neuritis, burning sensations of the skin on the hands and feet, pigmentation of the skin, atrophic condition of the skin on the dorsum of the hands, general thickening of the epithelium of the palms of the hands and soles of the feet, eczematous eruptions on the scrotum, and notching of the nails. All of the above changes occurred in the case reported by Alexander, but, as he points out, the same phenomena may be produced by *arthritis deformans*. As the result of experimental research, Macaggi² has demonstrated structural changes in the thyroid gland under the influence of arsenic and *phosphorus*. In acute intoxication with either of these drugs, there is a slight increase in the size of the gland, and the colloid passes into the lymphatics, besides being changed in its composition. In subacute and chronic intoxication the secretion of colloid is reduced and the epithelium becomes atrophied. Because of this latter fact Macaggi advises the use of arsenic and phosphorus in *hypertrophy of the thyroid gland*.

An obscure source of poisoning from arsenic has been pointed out by some investigations by the Department of Agriculture.³ It was disclosed that samples of wall-paper, stockings, furs, and rugs contained from 20 to 1700 times as much arsenic as would be allowed by the law of Massachusetts, the only State having a law regulating the quantity of arsenic that may be used. Doubtless many cases of obscure arsenical poisoning might be traced to a small abrasion of the foot or neck being brought into contact with hosiery or fur containing arsenic.

Atropine. The atropine treatment of *inebriety* recommended by McBride is favorably reported on by Simpson.⁴ The principles of this treatment, which were given in the September number of *PROGRESSIVE MEDICINE*, 1904, consist in: 1. The administration of atropine in $\frac{1}{80}$ gr. (gradually increased to $\frac{1}{40}$ gr.) doses three times a day until the pupils are

¹ Journal of the American Medical Association, February 25, 1905.

² Riforma Medica, 1904, No. 32.

³ Journal of the American Medical Association, October 22, 1904.

⁴ British Medical Journal, January 21, 1905.

affected and the mouth becomes dry. 2. Strychnine nitrate, beginning with $\frac{1}{60}$ gr., three times a day and increasing up to $\frac{1}{20}$ gr. 3. Fluid-extract of red cinchona bark every three hours in ordinary doses by mouth. 4. Through regulation of the bowels and an easily assimilated diet.

Sanders¹ has reported an unusual instance of *belladonna poisoning*, inasmuch as the untoward symptoms were produced by the application of a belladonna plaster. The usual symptoms of belladonna poisoning resulted. Morphine was used in this case, and in addition, pilocarpine nitrate.

Bathing. Marvel,² who has had a large experience with the after-effects of ocean bathing, has contributed an article on that subject. If after an ocean bath there is a general glow and a feeling of internal warmth, accompanied by a sense of invigoration, the effect is beneficial. On the other hand, if the bath is followed by chilliness, depression, and languor the bath is harmful. The practice of sitting about in wet bathing clothes after long exposure in the surf he strongly condemns. It is a difficult matter to tell patients just how long they should remain in the surf, inasmuch as the time it takes to produce chilliness and depression will necessarily vary in each individual. People should be instructed to leave the water while they are feeling perfectly warm and invigorated; this may be five minutes or as long as ten or fifteen minutes.

Marvel recommends sea bathing in cases with lessened metabolic activity or in those with a condition of perverted nutrition, as in some functional disturbances of long standing. It is contraindicated in cases with arteries which are weakened or have lost their elasticity, organic heart disease, recent rheumatism, cholelithiasis, acute gastrointestinal or febrile disease, or in any condition in which the normal resistance is greatly reduced. Pregnant women should not bathe when the sea is rough, as there is danger of miscarriage.

Marvel is undoubtedly right when he says that ocean bathing, as carried out at the Atlantic coast resorts, is productive of more harm than good. Individuals suffering from any acute or chronic disease should never bathe in the ocean unless they have first consulted a physician as to its advisability. Quite recently I have had an experience illustrating this point. A man with pulmonary tuberculosis which had undergone arrest spent two days at the seashore. During his visit he took an ocean bath, staying in the water for an hour and a half, which resulted in an obstinate attack of gastroenteritis and a relapse of the pulmonary condition.

Heubner³ recommends mustard-water packs in the treatment of *capil-*

¹ Journal of the American Medical Association, October 15, 1904.

² Ibid., April 8, 1905.

³ Therapie der Gegenwart, 1905, No. 1.

lary bronchitis. While the treatment fails in some cases, he considers it a most valuable procedure in those cases of capillary bronchitis where the respiration is embarrassed by the swelling of the mucous membrane and accumulation of inflammatory products in the finer bronchial tubes.

The mustard-pack is made and applied as follows: A pound of mustard flour is stirred in an open dish containing 3 pints of water heated to 104° until the irritating vapors of the mustard are given off. A linen cloth large enough to envelop the child is then wrung out in the mustard-water and spread over a blanket slightly larger. The child is then placed on the sheet and wrapped up from the neck down. The child is allowed to remain in the pack from ten to twenty minutes, the time depending on its vitality. When removed from the pack the whole body is red. Immediately on being removed from the pack the child is placed in a warm bath or sponged off with warm water, in order to remove any particles of mustard adhering to the skin. Following this the child is then placed in a lukewarm pack from one to ten hours, if possible, in order to maintain the hyperæmic condition of the skin. While in the second pack the child should be under constant supervision, as the temperature is liable to rise, accompanied with redness of the head and face; in the latter event or after free sweating the child should be removed from the pack. After removal from the second pack a second warm bath is given, and if the child is very hot cold water is quickly poured over it. The child is then wiped dry and left undisturbed for twenty-four hours. This procedure often results in a crisis with a rapid convalescence, but more frequently it must be repeated on the second or third day; it should not be employed oftener than once in twenty-four hours. In case the mustard-pack fails to produce reddening of the skin it is best not to repeat it.

For the purpose of producing sleep and allaying the nervous symptoms in *delirium tremens*, Broadbent¹ recommends ice-cold water sponging. The bath is given as follows: The patient is stripped and placed on a blanket over a waterproof sheet. By means of a large sponge the ice-cold water is then dashed violently over the face, neck, and anterior surface of the body. These surfaces are then dried by brisk friction with a rough towel, and the same procedure repeated a second and a third time. The posterior aspect of the body is then treated in the same manner. By the time the alternate sponging and drying are completed the patient is usually fast asleep.

Edgar² calls attention to some important facts regarding bathing during the *menstrual period*. He states that: 1. All forms of bathing during the menstrual period are largely a matter of habit and usually can be acquired by caution and gentle progression, but not for every woman

¹ British Medical Journal, July 1, 1905.

² Journal of the American Medical Association, October 22, 1904, p. 1256.

does this hold good, and surf bathing, where the body surface remains chilled for some time, should always be excepted. 2. A daily tepid sponge bath (85° to 92°) during the menstrual period is not only a harmless proceeding, but is demanded by rules of hygiene. 3. In the majority of, if not all, women, tepid (85° to 92°) sponge bathing after the establishing of the menstrual flow, namely, second or third day, is a perfectly safe practice. 4. Furthermore, in most women the habit of using the tepid shower or tub bath after the first day or two of the flow can with safety be acquired.

Anders,¹ after some personal observations at Bad Nauheim, has given his experience with the *Schott method of treating diseases of the heart and bloodvessels*. While this treatment has been firmly established as an excellent therapeutic measure for some years, it has met with little favor in this country, and, indeed, its action and mode of application is but poorly understood. The efficiency of the Bad Nauheim baths is not entirely due to the healing qualities of the waters, as the "resistance exercises" are almost of equal therapeutic value. In addition, careful attention is paid to the dietary, hours of sleep, recumbency, and after-treatment.

The bath waters at Bad Nauheim contain sodium chloride, calcium chloride, various forms of iron, and probably most important a large amount of carbonic dioxide. The baths are given at various strengths and different temperatures. The "resistance exercises" employed in the Schott method consists in the gentle exercise of different groups of muscles, especially those of the extremities, and exert their influence over the cardiovascular system rather than the muscular system. The exercises stimulate the peripheral motor nerves, while the baths act on the sensory nerve filaments. In this way a tonic effect is exerted on the myocardium. In addition, according to Broadbent, the movements drive the blood to the right side of the heart by compression of the veins.

Anders quotes the rules laid down by Thorne for the performance of these movements: 1. Each movement is to be performed slowly and evenly; that is, at a uniform rate. 2. No movement is to be repeated twice in succession in the same limb or groups of muscles. 3. Each single or combined movement is to be followed by an interval of rest. 4. The movements are not to be allowed to accelerate the patient's breathing and the operator must watch the face for the slightest indications of (a) dilatation of the alæ nasi, (b) drawing of the corners of the mouth, (c) duskiness or pallor of the cheeks and lips, (d) yawning, (e) sweating, and (f) palpitation. 5. The appearance of either of the above signs of distress should be the signal for immediately interrupting the movement

¹ Philadelphia County Medical Society, November 9, 1904.

in process of execution, and for either supporting the limb which is being moved or allowing it to subside into a stage of rest. 6. The patient should be directed to breathe regularly and uninterruptedly, and should he find any difficulty in doing so, he must be instructed to continue counting in a whisper during the progress of each movement. 7. No limb or portion of the body of the patient is to be constricted as to compress the vessels and check the flow of blood.

The use of resistance movements in heart disease has been discussed by Davis, whose article was called attention to in *PROGRESSIVE MEDICINE* for December, 1904, p. 325.

Anders states that while the Schott method is powerless to cure a chronic valvulitis, it is the most satisfactory means of bringing about compensation in either simple dilatation or in that form of dilatation associated with chronic valvulitis.

Cases with a moderate degree of arteriosclerosis and embarrassment of the heart action are greatly benefited by the treatment, as the lumen of the arteries, both large and small, is widened and the heart is thus relieved and given a chance to rehabilitate itself. Angina pectoris is another condition which is greatly benefited.

Anders also calls attention to a large class of cases with a moderate degree of dilatation brought about by severe mental taxation and characterized clinically by neurasthenic symptoms, evidences of malassimilation, and indigestion.

In order to prevent the sending of patients unsuitable for the treatment, the following contraindications should be borne in mind: 1. Cases presenting fever. 2. Advanced arteriosclerosis. 3. Far-advanced myocarditis. 4. The closing stages of chronic valvulitis with extreme dilatation. 5. Aneurysms of the large arteries, except in the incipient stage. 6. Any case in which the blood pressure is lowered by the balneologic treatment. 7. Cases in which a tenometric figure as low as 65 or 60 mm. of mercury is found. 8. Cases with well-marked chronic bronchitis or asthma.

In the discussion of Anders' paper, Tyson¹ stated that he had employed the treatment in the patient's home, but had experienced considerable difficulty in doing so. This was because of the lack of suitable assistants to oversee the resistance movements and to the inability to successfully secure the carbonic acid under sufficient pressure. Anders, in his paper, stated that he believed that much of the good effects of the bath were lost if the patient could not be freed from business and domestic cares and worriments. This was also concurred in by others.

Cohen² has used the Schott treatment in the patient's home for some years past and believes that excellent results can be obtained. As carried

¹ Philadelphia County Medical Society, November 9, 1904.

² *Ibid.*

out in the patient's home, Cohen recommends giving the baths in a course of six, eight, or ten weeks, interrupting them for eight, ten, or twelve weeks, and then repeating them for two or three weeks. These intervals of repeating and interruption may be again carried out according to the needs of the individual case. The bath is given at night, in order to secure several hours of continuous rest afterward. The bath is given every other day or every third day and is followed by massage, if necessary. On the alternate days exercise is given if this seems desirable.

Two or three baths with ordinary water at varying temperatures are first given, in order to note the results. A weak brine is then substituted, so that by the fourth bath 4 pounds of sodium chloride and 4 ounces of calcium chloride are contained in 40 gallons of water. At every second bath the sodium chloride is increased 2 pounds and the calcium chloride 2 ounces. At the twelfth or fourteenth bath the brine is not strengthened any more.

For the obtaining of a suitable carbonic dioxide effect, Cohen recommends the following method. The ordinary bath-tub is half-filled with hot water (about 20 gallons) and a sufficient quantity of sodium chloride, calcium chloride, and sodium carbonate is added. At the end of twenty minutes thorough dissemination has taken place, and 20 gallons more of hot water added. The temperature should be about 95°. Acid sodium sulphite (32 ounces), in the form of cakes (eight of 4 ounces each), is then distributed at proper distances, and in a few minutes there is thorough effervescence.

At the sixth ordinary brine bath the carbon dioxide may be added by taking half the quantity of sodium carbonate (16 ounces) and half of the acid sodium sulphate cakes. At the eighth or tenth bath the full amount of carbon dioxide may be used, and if gradually approached, the carbon dioxide may be doubled in amount.

The length of the first bath, according to Tyson, should be five minutes, at a temperature of 95°. The second bath may be increased to six or seven minutes, then gradually lengthened to ten or fifteen minutes. The temperature should be correspondingly reduced. At Bad Nauheim the lowest temperature at which the baths are given is 80° to 82°. Packages containing salts necessary for the baths may be obtained from the Triton Salt Company and Mr. H. A. Cassebeer, of New York.

G. W. Norris¹ has successfully applied the artificial baths in patients suffering from dilated heart. The cases in which he used the baths were tuberculous patients in the Phipps Institute. In each case there was a drop in the pulse rate and an appreciable decrease in the area of cardiac dulness.

¹ Personal communication.

Boric Acid. For years this substance has been looked upon as practically harmless, and little thought is ever given to the possibility of its producing toxic symptoms sufficiently severe to cause death. The greatest source of danger seems to be from packing wounds with the dry powder, although irrigations with solutions of various strengths have also produced fatal results. Best,¹ in reporting a fatal case, states that he found in the literature reports of five cases of severe intoxication and four deaths. Since the appearance of Best's paper Dopfer² has recorded an additional fatal case. In the instance related by Dopfer boric acid ointment was applied to the arm of a child, aged ten years, who had been severely scalded.

Chevalier³ states that the ill effects of the drug usually appear at the end of the third or fourth day, when the system has become saturated either through non-elimination or faulty elimination. The symptoms of boric acid poisoning are variable. Skin eruptions of various forms are common, as are also disturbances of the digestive tract, particularly vomiting. Symptoms of collapse are also common and there may be depression of the nervous system. Chevalier states that the effects of boric acid should be carefully watched in patients suffering from kidney disease, a fact which receives additional confirmation from the experimental work of Harrington.⁴ Bock⁵ recommends boric acid in the treatment of simple *parenchymatous goitre*. He administered the drug in 10-grain doses three or four times daily. He states that no ill effects were noted from these doses, probably because elimination was stimulated by the free use of water, two glasses being taken with each 10-grain dose. In connection with what has already been said about the toxic properties of boric acid, one of Bock's cases is of interest. In this instance the patient took the acid with only a swallow of water. A dermatitis was produced on the third day but quickly disappeared on the withdrawal of the drug.

Bromides. Morton and Hodskins⁶ state that they obtained the best results in the treatment of *epilepsy* with hypodermic injections of sodium bromide. They used a solution of 30 grains to the ounce. The injections were made just below the scapula, and the amount necessary varied from 60 to 180 grains. The injections were most successful in aborting a threatened seizure. The substitution of sodium bromide for sodium chloride reduced the quantity of bromide necessary by one-half. This

¹ Journal of American Medical Association, September 17, 1904.

² Münchener med. Wochenschrift, April 18, 1905.

³ Revue française de méd. et de chir., January 9, 1905.

⁴ American Journal of the Medical Sciences, September, 1904.

⁵ American Medicine, March 25, 1905.

⁶ Abstract American Medicine, June 24, 1905.

method does not entirely satisfy the craving for salt, however, and can only be employed in the more intelligent patients.

Peterson¹ is much opposed to the use of bromides in epilepsy, particularly in the manner usually employed. He states that as a rule the effects of the drug are worse than the disease. If the drug is to be used employ small doses, and, better still, instead of the ordinary bromide salts prescribed, some form of brominized oil which is less powerful and less noxious. Peterson states that the best results are obtained in epilepsy by the general hygienic and dietetic measures, preferably at one of the epileptic colonies.

Eichberg² has found *strontium bromide* of value as a diuretic, especially in cases of *nephritis*. He administers the drug in 10-grain doses three times daily, and after a good diuretic effect has been produced, the dose is cut down to 5 grains three times daily.

Bromide eruptions have been considered by Dr. Gottheil in the September issue of *PROGRESSIVE MEDICINE*. Additional views on the subject are given by Chirivino.³ He attributes this untoward effect to gastric disturbances. The bromides should not be administered in cases of hyperacidity; acids are to be avoided, and in cases of eruption the bromides should be suspended at once and the stomach treated.

W. P. Spratling⁴ is also opposed to the indiscriminate use of the bromides in epilepsy. He states that after half a century the bromides have not raised the percentage of cures in epilepsy a single point. Furthermore, they are not only powerless to cure but do much harm as ordinarily administered.

Spratling states that not more than 50 to 60 per cent. of patients with epilepsy should be given bromide in any form. When used it is not necessary to give more than 12 to 15 grains, or, at most, 20 grains, three times daily; emergency doses may exceed this. Among the factors that have led to the abandonment of bromide in treating epilepsy Spratling mentions the following: (1) The recognition during the past few years of the necessity of treating the individual *in toto*, in contradistinction to the treatment of a single symptom. (2) The use of depressants that possess the virtues of the bromides but not their faults, the chief agent of this kind being pure bromine in oil of sesamum, given in the form of an emulsion. (3) The use of Toulouse's method of a diet poor in salt to augment their value of relatively small doses of bromide. He states that with a diet low in salt that 10 grains of bromide will have the effect of twice that amount as ordinarily employed.

¹ American Medicine, June 24, 1905.

² Cincinnati Lancet-Clinic, October 8, 1904.

³ Giornale Internazionale delle Scienza Mediche, October 31, 1904; abstract Med. ital Record.

⁴ New York and Philadelphia Medical Journal, August 19, 1905.

For the first few years after the opening of the Craig Colony it was a common occurrence to admit patients showing marked evidences of bromism, in some there was pronounced bromic dementia. This was due to the enormous doses of bromide employed (40 to 60 grains t. i. d.). Spratling states that these conditions are becoming less noticeable, although the number of admissions is greater.

Cactus Grandiflorus. Ellingwood¹ believes that this drug is far superior to either strophanthus or digitalis, in that it produces no irritation of the heart muscle like strophanthus or gastric irritation like digitalis, and is, furthermore, free from any cumulative action. He recommends cactus grandiflorus when there is an irregular pulse, due to feebleness of the heart's action, with dyspnoea, weight or oppression in the chest, or when there is violence with irregularity of the heart's action, and especially when there is a sensation of constriction, as of a band around the heart or around the chest.

Ellingwood says the drug should be persisted in when the heart muscle is enfeebled or when there is mitral or aortic insufficiency with atonicity.

In functional irregularity of the heart, especially if due to gastric irritation, it is doubly of value in that it corrects the cardiac condition and soothes the gastric irritability.

Functional disturbances resulting from tobacco, particularly cigarettes, are extremely amenable to cactus grandiflorus.

The sedative action of the drug makes it of value when there is an irritable, irregular, and feeble pulse in the presence of fever, or when there is cardiac weakness associated with a weak and exhausted nervous system. Atonicity, Ellingwood states, is the keynote in its administration, and for this reason renders it particularly serviceable in the cardiac weakness following typhoid fever or other severe and exhausting diseases. Cactus grandiflorus is contraindicated when there is violent heart action or persistent palpitation from increased tonicity or in the presence of a temporary exaltation of nervous or muscular tone.

It is administered in the form of the tincture, in 2 to 8 minim doses or the fluidextract, in 2 to 4 minim doses. Ellingwood recommends that the drug be given in small doses, frequently repeated, especially when a sedative action is desired.

Camphorated Naphthol has been used in the form of injections for *cold abscesses*. Broca,² however, does not believe camphorated naphthol of much value. He was further influenced in abandoning it because a number of deaths have been reported from its use, and besides, it has been shown experimentally that it is very toxic for both rabbits and guinea-pigs.

¹ Medical Record, June 3, 1905.

² Revue française de med. et de chir., February 13, 1905.

Guinard¹ has reported a death from an injection of camphorated naphthol, and has found 12 additional cases in the literature. There are, in addition, a number of instances in which convulsions and other symptoms of intoxication occurred, but the patients recovered.

Carbolic Acid. Adams² reports a case of *carbolic acid poisoning* simulating acute scarlatinal nephritis. A child, aged ten years, with a moderately severe attack of scarlet fever, developed intense itching of the skin. To allay this symptom the mother was instructed to bathe the child twice daily with a solution of carbolic acid (a teaspoonful to a quart of water). The itching was relieved, but thirteen days later the child passed some dark urine, which was found to contain carbolic acid. The eyelids were slightly puffed. The kidney irritation promptly subsided after the elimination of the carbolic acid.

Two cases of carbolic acid poisoning have been successfully treated by the internal administration of *vinegar*. One of the cases is reported by Zelensky³ and the other by Sz wajkart.⁴ Burke⁵ places no confidence in the sulphates as antidotes for this condition. He believes that *alcohol*, however, is of great value. It should be given in the form of whiskey by mouth, and if this cannot be done the alcohol should be administered hypodermically and by the rectum.

Castor Oil and Salts. The following formulæ are recommended by Carlton⁶ for the administration of castor oil and magnesium sulphate:

1. Olei ricini dulcis.

R—Vanillin	gr. xx.
Olei menth. piper.	f 3 j.
Saccharin.	ʒ iss.
Alcohol	f 3 iij.
Tr. persionis	f 3 ss.
Olei ricini	q. s. ad ½ gallon.

DIRECTIONS FOR MIXING. Dissolve the vanillin, oil of peppermint and saccharine in the alcohol. Add the tincture of cudbear to the oil and shake thoroughly. Finally unite the two mixtures. This mixture keeps well, has no bad after-taste, and is readily taken by children or adults who have acquired a repugnance for the oil.

2. Liquor magnesium sulphatis compositus.

R—Magnesii sulphatis	ʒ xxxij.
Tr. cardamomi comp.	f 3 ij.
Vanillin	gr. xx.
Saccharin.	ʒ ij-iv.
Alcohol	f 3 ij.
Glycerin.	f 3 ij.
Coffee (roasted and ground)	ʒ ij.
Aquæ	q. s. ad ½ gallon.

¹ La semaine médicale, Dec. 28, 1904.

² La semaine médicale, Sept. 7, 1904.

³ New York Medical Journal, Oct. 8, 1904.

⁴ Archives of Pediatrics, Dec., 1904.

⁵ American Medicine, Dec. 31, 1904.

⁶ Medical News, Oct. 8, 1904.

DIRECTIONS FOR MIXING. Stir the coffee in $\frac{1}{2}$ gallon of boiling hot water and allow it to stand for ten to twenty minutes. While this is still hot add enough of it to the magnesium sulphate to make about $3\frac{1}{2}$ pints. Dissolve the vanillin in the alcohol, add the glycerin to it, and then the cardamom. When the first solution has cooled somewhat, add the second mixture to it. After shaking thoroughly, add the saccharine and enough of the coffee infusion to make $\frac{1}{2}$ gallon. Finally, pass through a covered filter.

An ounce of this mixture contains $\frac{1}{2}$ ounce of the magnesium sulphate.

Carlton states that this mixture may be given hot or cold, and that it is his custom to dilute it with twice its volume of water at the time of administration.

Chlorate of Potassium. A well-marked case of poisoning from chlorate of potassium is reported by Day.¹ The case also illustrates the pernicious habit of applying to druggists for medical advice. In this instance a man complaining of a slight sore throat was given a bottle of potassium chlorate tablets. The bottle contained fifty tablets of 5 grains each, and was consumed between March 19th and April 1st. On April 2d he complained of itching, and this continued for four days, when he consulted a doctor. At this time, in addition to the itching, he had a temperature of 101°, and scattered over the extremities and trunk there appeared slightly raised reddish macules and innumerable petechiæ, evidently due to minute hemorrhages. These rapidly coalesced and became of a more brilliant color. The urine showed a trace of albumin and a few hyaline and granular casts. Although this drug is capable of a most destructive action on the blood, no such effect was noted in Day's case, the examination showing 5,016,000 reds. The hæmoglobin could not be estimated, as the blood was of a deeper red than the test-glass used. Recovery in this case was slow and uneventful.

Chloretone. According to Bowcock,² chloretone is an ideal hypnotic, as it does not depress either the heart or respiratory centres and is free from the danger of becoming a "habit." It is also sedative in its action, rendering it of value in the treatment of *asthma*, *epilepsy*, and particularly the *vomiting of pregnancy*. The drug is soluble in alcohol, ether, oils, and glycerin, and is unaffected by light or heat. The dose is from 10 to 20 grains. It may also be administered in the form of sugar-coated tablets, 3 grains each.

Chloride of Calcium. In a study of *hæmophilia*, Kinnicutt³ found the following treatment the most satisfactory for this condition: The internal administration of calcium chloride in doses of 30 grains two or three times daily. Its use should be discontinued every two or three days for

¹ Journal of the American Medical Association, July 22, 1905.

² Medicine, October, 1904.

³ Medical Record, June 10, 1905.

a period of twenty-four hours. For accessible external bleeding points an aqueous solution ($\frac{1}{2}$ per cent.) of calcium chloride may be applied with compression or the calcium may be applied in the form of a finely powdered chalk mixed with $\frac{1}{2}$ per cent. solution of calcium chloride. Calcium phosphate is also equally efficient for local application. A $\frac{1}{2}$ per cent. solution of calcium chloride and $\frac{1}{4}$ volume of a solution of nuclealbumin may also be used locally. Other local measures are the application of a stream of *carbonic acid gas* to the bleeding point when accessible or its inhalation, freely mixed with air for concealed hemorrhage; the use of 4 per cent. solution of cocainæ hydrochlorate for surface bleeding and of adrenalin (1:1000) with compression.

Sahli,¹ however, states that the internal use of calcium chloride is still on trial, and that if used locally it should be forced into the lumen of the vessel by compressing the bandage. Sahli, from a number of tests on 4 hæmophilics, states that the best results are obtained by the use of a thick and firmly applied 2 per cent. gelatin gauze dressing.

Chloride of Ethyl. Morrow² found the chloride of ethyl very efficient as a counterirritant in the treatment of *herpes zoster*. He states that in cases in which the pain has been so severe as to cause sleeplessness, this treatment will give great relief. An area the size of a silver dollar is frozen at the point where the nerve emerges from the spinal column, or, better still, areas may be frozen where the pain is localized. Relief may be obtained from one freezing for a day or more. Where the relief lasts but for a few hours there is no objection to applying the ethyl chloride frequently.

Chloride of Sodium. In an editorial on the subject of saline infusions Hare³ urges that physicians and surgeons use more care in the preparation of the physiological salt solution. Haphazard methods are to be discouraged, and the old rule that the solution may be made by adding a teaspoonful of common salt to a pint of water should be avoided. There is no reason now why accurate solutions are not available for everyone, as a concentrated saline solution made after the formula of Ringer, as modified by Locke, can readily be obtained either from any druggist or direct from Parke, Davis & Co., the manufacturers. Hare points out the necessity of accuracy in the preparation of a salt solution, from the fact that too little salt causes the corpuscles to swell and lose their hæmoglobin or even entirely destroy them; if the solution is too concentrated the corpuscles shrink. The proper strength of the saline solution is 0.9 per cent., and it has been also demonstrated that a small amount of calcium and potassium is necessary. In this connection a fatal case of

¹ Zeitschrift f. klin. Medicinische, 1905, Nos. 3 and 4.

² Journal of Cutaneous Diseases, April, 1905.

³ Therapeutic Gazette, November 15, 1904.

sodium chloride poisoning reported by Combs¹ is of interest. During a vaginal operation 500 c.c. of saline infusion were ordered to be injected beneath each breast of the patient. By mistake the concentrated stock solution was given instead of being diluted 0.9 per cent. Four hours later the patient was unconscious, and at this time it was discovered that the concentrated solution had been used. Estimation of the sodium chloride showed that 1920 grains had been absorbed and diffused throughout the body. The patient remained in coma for six hours, when she became maniacal. The pulse was 190, respiration 70, and the temperature slowly rose to 104.6°. The nausea was constant and the thirst insatiable. A quantitative examination of the vomitus showed 5 grains of sodium chloride per drachm. The red blood corpuscles were shrivelled and crenated from exosmosis. Death occurred in twenty-four hours.

Souther,² who has contributed an article on the indications for hypodermoclysis, names the following conditions: Excessive hemorrhage from any cause; the infections and toxæmias; suppression of urine not associated with dropsy; shock; inability to otherwise introduce sufficient fluid into the body; concentration of blood; as an anteoperative measure in anæmic conditions in patients who have lost much blood or in bloody operations on aged subjects; postoperative thirst and threatened collapse in cholera infantum, cholera morbus, or Asiatic cholera.

Hypodermoclysis is contraindicated in apoplexy, arteriosclerosis, pulmonary oedema, dilated right heart, threatening sudden death and sudden collapse from chloroform or ether narcosis. In the latter condition it is too slow to be of service. It may also be added that in the light of recent investigations sodium chloride infusions should not be employed in uræmic conditions.

Investigations continue on the *dechloridation treatment* or salt-free diet in *nephritis*. At the twentieth annual meeting of the Association of American Physicians two papers were presented on this subject. Kelly and Fife reported on three cases of chronic nephritis in which salt had been rigidly excluded from the diet. They concluded that such a diet was of value and had some prognostic significance in estimating the severity of the lesion. The use of saline solutions in nephritis was condemned as being harmful. J. L. Miller also presented a paper on this subject. He found that there was a poor elimination of sodium chloride in nephritis, and following the use of large amounts there was an increase in the oedema, albumin, and uræmic symptoms. In the discussion following these papers several of the speakers referred to the injurious effects of saline solutions in nephritis.

¹ American Medicine, April 22, 1905.

² Cincinnati Lancet-Clinic, September 17, 1904.

Ambaro and Beaujard¹ state that for the retention of chlorides, with the resulting headache, dyspnoea, and high arterial tension, a salt-free diet, theobromine, free purgations, and rest in bed is the best treatment. These writers believe that a salt-free diet must be kept up indefinitely in order to guard against danger. Additional information on this subject is contained in Dr. Bradford's article in the present volume.

Muskens² reports that a salt-free diet in *epilepsy* resulted in a more favorable action of the bromides. Women bore the treatment better than men and the attacks of *petit mal* were more influenced than those of *grand mal*. A salt-poor diet has been in use at the Massachusetts Hospital for Insane for several years. Morton³ states that the treatment consists in the substitution of sodium bromide for sodium chloride. It is claimed that by using the bromide in this way only about half the quantity is necessary. This form of treatment can be successfully carried out in intelligent patients, but is practically useless in middle grade epileptics who have neither the will nor the desire to carry it out properly. In the idiotic and demented patients a salt-poor diet, in which equal parts of sodium chloride and sodium bromide may be used.

Collins⁴ states that two years ago 25 hospital epileptics were given a reduced salt diet, which resulted in a reduction of 38 per cent. in the frequency and severity of the epileptic seizures. The same treatment was recently applied in 5 dispensary patients, with the result that the frequency of the attacks in 4 of them was reduced 50 per cent.

Griess⁵ states that the objectionable features of *silver nitrate* in the treatment of *chronic anterior* and *posterior urethritis* may be overcome by the use of sodium chloride. By its use the caustic effect of the silver is to a great extent eliminated and stronger solutions of the silver may be employed. The sodium chloride solution is injected with a Keyes-Ultzmann deep urethral syringe in the same manner as the silver solution. Enough time should elapse after the injection of the silver to allow the operator to wash out the instrument, fill it with salt solution, and proceed as before.

Climate. The influence of climate in the treatment of pulmonary tuberculosis has led to many acrimonious discussions in the past, and it seemed at one time as though the divergent views on the subject would never be reconciled. Within the past few years, however, the view that climate is the all-important factor has been greatly modified.

Thus, the report of the Committee on the Influence of Climate in

¹ La semaine médicale, 1905, tome xxv., No. 12.

² Neurologisches Centralblatt, March 1, 1905.

³ Boston Medical and Surgical Journal, June 15, 1905.

⁴ American Medicine, June 17, 1905, p. 974.

⁵ Therapeutic Gazette, September 14, 1904.

Pulmonary Tuberculosis, read before the National Association for the Study and Prevention of Tuberculosis, is of particular interest in that it was made by Minor, Solly, Baldwin, McGahan, Sewall, and Bridge,¹ all of them men having strong climatic affiliations. In this report the committee states that no advanced worker in this line would to-day, as was formerly done, place climate first in the order of therapeutic measures. It must never be forgotten that hygiene, diet, teaching, and supervision always come first. They state, however, that these measures yield infinitely better results if reinforced by a suitable climate. This latter fact, I think, is pretty generally conceded, provided, of course, that the patient is able to avail himself of this additional advantage.

The Committee endorsed the following quotation previously published by one of its members: "If, however, one has to choose between treating patients in narrow circumstances in their own homes or sending them to a resort where their poverty will not enable them to get the necessary conditions of quarters, diet, and care, which are so essential, by all means let them stay at home. By changing their houses, by moving to the top floor, using the roof as an out-door sun parlor and spending the utmost possible part of their time there, by economizing in every other way in order to be able to spend more freely for good food and cookery, much can be done, provided always that their lives can be properly supervised. When pecuniary reasons prevent the patient from seeking a special climate excellent results can thus be had, though with greater difficulty in the patient's home, if the case is not too far advanced and that home too miserable."

As a warning to those who send patients to the various climate resorts without first thoroughly investigating both their physical and financial status the experience of Mr. F. D. Witherbee² may be cited. In an investigation of the health resorts in the great Southwest he learned that from two-thirds to four-fifths of those sent there were hopelessly incurable and beyond the help of any power on earth. He found the streets filled with these poor consumptives—thin, wretched, homesick, and suffering, and, worst of all, in many cases utterly destitute. The hospitals, sanatoria, and almshouses were filled with indigent, dying consumptives; public and private charities were taxed to their utmost, and only too frequently the wretched sufferers died alone and unattended in some lodging-house. What he characterizes as the "inexcusable stupidity which sends these people hither to die friendless and alone," cannot, however, be entirely laid at the door of the medical profession, as a not inconsiderable proportion of them seek these resorts on their own responsibility.

¹ Journal of the American Medical Association, June 10, 1905.

² Charities, November 6, 1904.

In commenting on Mr. Witherbee's paper the *Journal of the American Medical Association*, November 19, 1904, concludes with the following: "Our knowledge of the proper treatment of tuberculosis has increased so enormously of late years that there is no longer any excuse for this blind, indiscriminating method of shipping out West consumptives of all classes in all stages of the disease. Rather let us reserve that treatment for the favored few who have ample means, and for the others let us direct our energies, in the first place, to the providing of sanatoria in our own states; sanatoria for those of small means and for those of no means at all. In the second place, and this is even more important, let us endeavor to devise methods of home treatment for tuberculosis, for this is the only way in which the modern treatment for that disease can be applied to the great majority of its victims."

The number of articles bearing on the subject of what is best for the tuberculous patient has been extremely large during the past two or three years. In fact, the subject has been so thoroughly rehashed that there is little excuse for not knowing what to do in any given case. Dunn¹ has recently written an article in which he points out the class of cases in which climate may be entirely ignored: 1. When the financial status of the patient is such that he cannot live in a health resort under conditions just as good as those obtainable at home, with or without the same expenditure of money. 2. When the patient has not the moral backbone to make a business of getting well. 3. When the disease has become hopelessly advanced.

In order to eliminate the first class a knowledge of both the patient's financial status and the rates of living at the various resorts is necessary. This is too frequently neglected and patients are carelessly ordered to this or that resort without knowing whether they can even afford it. With those who lack perseverance experience, as a rule, is the only guide.

There should be no difficulty with the hopelessly diseased cases. Unfortunately, many of these cases are sent to health resorts either through a misapprehension of what can be accomplished for them or through failure to realize the extent of the involvement.

A complete directory of institutions and societies dealing with tuberculosis has been compiled by Lilian Brandt. It is published by the Charity Organization Society of New York and the National Association for the Prevention and Study of Tuberculosis. The directory contains full information as to the situation, means of reaching, and cost of maintenance at the Sanatoria in the United States and Canada.

While climate has been relegated to a secondary place in the treatment of pulmonary tuberculosis, *surgical tuberculosis*, particularly in

¹ American Medicine, August 26, 1905

children, seems to be most favorably affected by residence at the seashore. The advantages of a stay at the seashore in the treatment of surgical tuberculosis have long been recognized by French physicians, and there are at present a number of institutions in France devoted exclusively to this form of the disease.

Until very recently there was no institution of this kind in this country. Recognizing the importance of the subject the Society for the Improvement of the Conditions of the Poor in New York City has established a seaside camp at Coney Island for the treatment of this class of cases.

Wallace¹ has recently published a preliminary report on the first year's work at this camp. The four factors in the treatment are: 1. Sea air, night and day. 2. Cheerful, normal surroundings. 3. Ample, nourishing food. 4. Orthopedic treatment. The results so far are most encouraging. Wallace states that he feels that it has been proven beyond any question that out-of-door treatment in surroundings normally adapted to child life is more effective than the best possible treatment in wards, and that fresh air is as essential in surgical tuberculosis as it is in pulmonary tuberculosis.

While it remains to be proven whether out-of-door salt air is more efficacious than out-of-door inland air, he believes that the time will come when there will be a number of these seaside hospitals in America.

Otis² recommends change of climate in the treatment of *chronic bronchitis*. He states that if the condition is not checked each succeeding winter finds the cough more annoying; this readily leads to emphysema, so that in addition to the coughing paroxysms, dyspnoea on exertion, and asthmatic attacks are added to the patient's discomfort. In his opinion the best climate is that which will enable the patient to pass most of his time out-of-doors in a pure atmosphere. For this purpose any region moderately warm, with an equable temperature, an abundance of sunshine, and freedom from chilly winds and dust will do. Dry irritative coughs with scanty expectoration do better when there is some moisture in the atmosphere.

Arellis³ calls attention to the difficulties in finding a suitable place for sufferers from *asthma*. Thus, some do well in high valleys, others on the plains, while still others have entire freedom in the dust-laden air of a city. The place which will give freedom from the asthmatic paroxysms must be sought for by each individual for himself. Arellis favors special sanatoria rather than any special climate. In these special sanatoria he believes better results can be obtained through therapeutic

¹ Medical Record, July 22, 1905.

² Boston Medical and Surgical Journal, April 27, 1905.

³ Münchener med. Wochenschrift, November 15, 1904.

suggestion and medicinal guidance of the nervous system than in any of the most famous health resorts.

Bürker,¹ from experiments made with rabbits, concludes that the climate of mountains has an unmistakable effect on the blood. The observations were made at an elevation of 6000 feet. The first effect noted was an accumulation of iron and hæmoglobin in the liver and blood. By the second or third week the blood forming organs produce a new supply, the liver takes up its iron, and the blood takes up the hæmoglobin.

Northrup,² who has previously advocated fresh cold air in the treatment of *pneumonic conditions in infants*, has again written on this subject. He reports two cases in which the windows of the sick room were kept open day and night. Although poorly nourished and desperately ill, both these children recovered. The advantages claimed for fresh cold air by Northrup are that it stimulates the heart, improves digestion, quiets restlessness, and aids in overcoming the toxæmia. The following directions "How to kill a baby with pneumonia" are so forcible that I give them in full: Crib in far corner of room with canopy over it; steam kettle; gas stove (leaky tubing); room at 80°; many gas jets burning. Friends in room, also the pug dog. Chest tightly enveloped in waistcoat poultice. If child's temperature is 105° make a poultice thick, hot, and tight. Blanket the windows, shut the doors. If these do not do it, give coal-tar antipyretics and wait.

The fresh-air treatment of bronchopneumonia in children was mentioned in last year's *PROGRESSIVE MEDICINE*, p. 319.

Codeine. A case of codeine habituation is reported by Pelz.³ He believes this is the first true case of codeine addiction to be recorded.

Dichondra. Aramian⁴ claims that the extract of dichondra will completely destroy *diphtheria bacilli* within two to five days, and that furthermore it has no irritative or caustic effect on the throat, and swallowed even in large quantities, produces no ill effects. The extract of dichondra is obtained from the seeds and stems of the *Dichondra brevifolia*, and is a thick liquid of a dark-brown color, having a slightly bitter taste.

What Aramian terms *antidiphtherin* is a solution composed of one part of this extract and three parts of glycerin. He advises the use of the antidiphtherin with antitoxin, as it will kill the bacilli and thus hinder the further production of toxin. In addition it will make the throat germ free and thus shorten the period of isolation, which is often unduly prolonged.

¹ Münchener med. Wochenschrift, February 7, 1905.

² Medical Record, February 18, 1905.

³ Deutsche med. Wochenschrift, June 1, 1905.

⁴ Medical Record, March 4, 1905.

Diet. Contributions on the subject of diet in the treatment of disease have been unusually numerous during the past year. For some time past there has been a growing tendency toward a more liberal diet in *typhoid fever*. The long-accepted belief that a diet consisting mainly of milk should be the principal food in typhoid fever has become so firmly implanted in the minds of the profession that the suggestion of any departure from it is looked upon as the height of folly.

Nichols¹ has contributed an article on the history of the dietetic methods in typhoid fever. As a result of this study he finds that the feeding of typhoid fever patients has been largely empirical and has not been guided by the scientific principles which have characterized the feeding of infants. He furthermore states, that while from time immemorial solid food has been regarded as totally inadmissible in fever, the idea is erroneously based on the belief that solid food is less digestible than liquid food, more irritating to the intestines, goes through the alimentary canal in a more solid and bulky form, or in some occult manner augments the disease process in a way that a corresponding amount of liquid food will not.

These theories he believes are open to criticism. In his opinion well-divided solid proteid food is as easily digestible as the liquid proteid of eggs or milk, as both kinds of proteid have to go through exactly the same digestive process before they can be absorbed. For this reason he asserts that meat and eggs are certainly no more, rather much less, provocative of intestinal indigestion and fermentation than milk.

In another article on the dietetic management of typhoid fever Nichols² considers the various articles of food which may be used. Studied from the standpoint of nutritive value, digestibility, palatability, and innocuousness, he believes that the dietary of the typhoid patient may be made up from the following articles: milk, cream, soup, broths, eggs, custards, ice-cream, meat, chicken-jelly, wine-jelly, rice, cereals, milk-toast, cocoa, and alcohol.

While soups are mentioned Nichols is not particularly in favor of them because of their low nutritive value. He sees no reason why eggs should not be served in the form most palatable to the patient, that is, soft or hard boiled, scrambled or raw. In using red meats care should be exercised to see that the indigestible parts are thoroughly removed. From a study of the literature he finds that no one who has used a varied dietary in the management of typhoid fever condemns it, and that all are agreed that it in no way increases the tendency to hemorrhage, perforation, tympanites, diarrhoea, or relapse.

From a personal experience with a more or less liberal diet in typhoid

¹ Medical Record, July 29, 1905.

² American Medicine, May 6, 1905.

fever and from a review of the papers of others who have used similar methods Nichols states that the results yielded have been highly satisfactory and most gratifying. The patient's strength, nutrition, and general condition seem to be better maintained; they are more comfortable and contented, and suffer less from hunger, especially the distressing hunger ordinarily present in the early convalescent period.

Hare¹ advocates a semisolid diet after the first week in typhoid fever. It is his practice to give one to two soft-boiled eggs daily in addition to the daily allowance of milk and to further vary the diet by the use of curds-and-whey, rice boiled to a pulp, barley-, wheat-, and oatmeal-gruel, and a cup of corn-starch with vanilla of other flavoring substance. Owing to the lack of secretion of gastric juices Hare recommends hydrochloric acid and pepsin when proteids are given and taka-diastase and pancreatin when carbohydrates are used. Beef-tea he condemns as being an excellent culture medium and also because it frequently increases tympanites and diarrhoea, the stools becoming fetid under its use.

As a result of his experience with a more liberal diet Hare has seen very little of the marked ataxia common in the convalescent period of typhoid fever, and furthermore the nutrition is so well preserved that in many cases emaciation is no more marked than in many cases of croupous pneumonia. Secondary complications such as furuncles and bed sores are extremely rare, as the vital resistance is maintained so well that simultaneous collateral infections do not take place.

Johnston² is another recent advocate for a more liberal diet in typhoid fever. In an experience with 105 cases, 51 of which were treated in the generally accepted manner and 54 with a liberal diet, he found that the latter were less toxic, were no more emaciated than the other cases, and made a quicker convalescence. In the series treated with a liberal diet there were but three relapses, no perforations, and few hemorrhages. Johnston states that there are three periods in typhoid fever in which the question of diet must be determined: first, the toxic period, when there is complete anorexia or even repulsion for food; second, the period of reaction from toxic effects, when the appetite returns but fever is present; third, the period of convalescence, when the appetite is clamorous and the fever is disappearing or gone.

In the first period Johnston gives every twenty-four hours twelve ounces of peptonized milk well diluted with water and the albumen (whites) of two eggs in six ounces of normal salt solution (the salt solution was not insisted on if distasteful, but was given to aid in counteracting the toxæmia). The milk and albumen-water were given at three-

¹ Therapeutic Gazette, September 15, 1904.

² Pennsylvania Medical Journal, March, 1905.

hour intervals. Should vomiting, tympanites, or diarrhoea be present or hemorrhage occur all food was stopped until these complications had disappeared.

During the second period, in which there was a return of the appetite, coffee, tea, steamed broths, albumen-water, milk, buttermilk, koumis, beef-juice, orange-juice, etc., were given in suitable quantities every three hours. When the temperature had been normal for a full week and the appetite vigorous, even if the tongue was not entirely clean, eggs, oysters, custards, junket, toast, and a gradually increasing solid diet was allowed.

Thompson¹ is opposed to the continuance of a milk diet in typhoid fever until convalescence has been thoroughly established. This practice, he believes, not only protracts the convalescent period but by impoverishing the nutrition renders the patient far more susceptible to complications such as thrombophlebitis, neuritis, furunculosis, etc. It is now his rule to begin with semisolid food on the day on which the temperature first reaches normal. He employs soft-cooked eggs, baked custard, junket, milk-toast, mutton- or chicken-broth thickened with rice or crackers, plain gelatin foods, like blanc-mange and wine-jelly, and light farinaceous foods, such as farina and boiled rice with beef-juice. On the third day, if convalescence is uninterrupted, a scraped beef-sandwich is given.

This writer recommends this increase in the dietary, as soon as the temperature first becomes normal, in very mild cases in general, and in any case in which the patient has a fairly clean, moist tongue, a soft abdomen, stools which are nearly normal in consistency, a clear mind and eye, and no serious complication. Such a diet should be avoided, however, if there be much tympanites, diarrhoeal stools, or recent severe hemorrhage.

Thompson states that there is another class of patients in which the main danger is in the rapid loss of nutrition. In this class while the temperature remains low (101° to 102°) the loss of weight is rapid and emaciation and asthenia becomes most pronounced. In order to prevent complications in these cases a better nutrition is imperative. In these cases he abandons milk altogether or gives it in a predigested form reinforced with beef-juice, white of an egg, milk-sugar, orange-juice, and light farinaceous gruels. Semisolid food is also administered before the temperature is actually normal. He also calls attention to another group of cases in which the febrile course is of considerable severity. In these cases the temperature remains normal or subnormal for an hour or two each day, but rises again to 100° or 101°, the fluctuations

¹ Medical Record, December 10, 1904.

continuing into the fortieth or fiftieth day without any discoverable complications. In this class semisolid food is a necessity and often results in a normal and uniform temperature within twenty-four hours. Thompson insists that the best guide in feeding a typhoid patient is not the temperature alone but rather the state of digestion and the general condition as evidenced by the appearance of the tongue, the abdomen, the stools, the appetite, and the feces. He also recommends the abandonment of milk and the substitution of beef-juice, egg-albumen, and broths in tympanites or any other manifestation of indigestion.

Edsall¹ states that a possibly frequent source of severe diarrhoea in typhoid fever may be the milk. In a recent experience he was led to investigate the purity of the milk, believing that it was possibly the cause of an otherwise unexplainable diarrhoea. His suspicions proved correct, and with Pasteurization of the milk supply the diarrhoea subsided.

The question of diet in *pulmonary tuberculosis* has been well treated in a series of three articles in the *Practitioner* for January, 1905. The first article, by Philip, on zomotherapy has been the subject of considerable editorial comment, and while his claims for it are most enthusiastic, the treatment has never met with much favor, particularly in this country. He gives the meat either minced or bruised, slightly seasoned with salt, three times a day, in half-pound quantities. It may be served cold or gently warmed, according to the taste of the patient. The meat must be absolutely fresh. Freshly prepared beef-juice and even beef-soup are also recommended.

The beef-juice is prepared as follows: Extract one-half pound of meat in one-half pint of cold water plus one-half teaspoonful of salt, and slowly heat to 100° F. Express the liquid through a cloth and serve. The juice may also be expressed through a cloth without the addition of water.

The raw beef soup is prepared by mixing one-half pound of finely minced fresh meat with sufficient milk to produce a thick uniform paste. Immediately before serving add one-half pint of milk at 150° F.

Philip claims for this diet that it favorably influences all untoward symptoms, such as temperature, pulse rate, anæmia, etc., and that in addition it yields excellent gains in weight, the gain being the result of increased musculature and not fat. His best results were obtained in the early cases. It is to be borne in mind, however, that early cases, providing they have an abundance of fresh air and avoid overexertion, will do well on any wholesome diet.

Galbraith² has also contributed an article on zomotherapy which is favorable to its use in pulmonary tuberculosis.

¹ Pennsylvania Medical Journal, March, 1905.

² Practitioner, February, 1905.

Burton-Fanning and Latham¹ are both in favor of a diet consisting entirely or in part of milk. I think most will agree with Burton-Fanning that milk is the sheet-anchor in the treatment of pulmonary tuberculosis, and that it is by varying the quantity of milk that we can most readily affect the ordinary patient's weight.

Latham divides tuberculous cases into two broad classes: 1. Those who have sound digestion and who are able to take exercise. 2. Those who are suffering from high fever or any disorder of digestion. The first class may be given an ordinary wholesome diet reinforced by a quart to a quart and a half of milk daily. In this class the vast majority of incipient cases will be found, and as great losses of weight are unusual in these patients the maintenance of a good nutrition rather than great gain in weight is the object desired.

The second class of Latham, namely, those with high fever and a disordered digestion or other marked constitutional symptoms, milk should be the staple diet. Latham in his article refers to the beneficial use of alcohol when fever is present. The use of alcohol in pulmonary tuberculosis is not recommended in any stage of the disease by the best authorities in this country.

There is an aspect of the food question in tuberculosis which has not been sufficiently dwelt upon, namely, that of cost. Admitting all the advantages claimed for zomotherapy the treatment would still be out of the reach of fully 90 per cent. of tuberculous patients because of the cost of good fresh meat. On the other hand, admitting that milk has less value as a food than is claimed for it, its cheapness and the fact that there is no waste, puts it within the reach of all patients. Practically every article of diet, except milk, contains a varying proportion which from one reason or another goes to waste; the quantity of milk, however, which goes to waste is practically nil.

In the treatment of *heart disease* Schott² warns against allowing the patients to eat food which produces flatulency. The flatulency proves harmful in three ways: 1. By pressing the diaphragm upward against the lungs and thus impeding respiration. 2. By pressing the heart upward and outward so that its action is carried on with difficulty. 3. Intra-abdominal pressure is increased and the abdominal vessels compressed. It is also for these reasons that effervescing beverages, carbonated waters, champagne, and beer are frequently harmful in patients suffering from heart disease.

Schott recommends that the food be taken in small quantities at three-hour intervals in order to avoid overloading the stomach and that the last meal be eaten at least two to two and a half hours before retiring, otherwise there is danger of disturbed sleep.

¹ Loc. cit.

² Lancet, 1904.

Freshly made bread or cakes are to be avoided; toast, zwieback, and the crust of rolls are allowable. Beans, peas, lentils, sauerkraut, cabbage, onions, garlic, and celery are to be avoided as being indigestible and also because of their tendency to produce flatulency. Potatoes boiled or in the form of a purée are excellent, as are also young turnips and carrots. Meats are permissible with the exception of fat goose breasts, goose livers, fat ham, bacon, and sausages. Smoked or salted fish is to be avoided because of the thirst it produces. Rich sauces, dressings, seasonings, and spices must not be used. Raw or stewed fruits are allowed, with the exception of raspberries, gooseberries, currants, cranberries, or pineapples. Ice in any form must be used cautiously, as it is prone to produce gastrodynia or congestion of the liver. This fact should be kept in mind in prescribing ice for vomiting.

The diet best adapted for *nephritis* is one of considerable importance, and must be kept constantly in mind in the management of the disease. In the treatment of the acute forms of the disease it is pretty generally agreed, as Jackson¹ states, that the diet must be cut down to the lowest point compatible with the maintenance of a fair degree of nutrition and that this diet should be one suitable for an acute febrile disease. The same rule holds true for acute exacerbations of the chronic forms. The general rules for the management of the chronic type of nephritis as given by Jackson are as follows: Highly seasoned foods are to be avoided; the food should be simple, nourishing, and moderate in quantity. Owing to the nutritive value of fats patients should be encouraged to eat as much butter and cream as can easily be digested.

As an example of the proper diet is the following: Breakfast—cereal with cream, egg, bread and butter, very weak coffee (with a great deal of cream), a glass of milk, and fruit. Dinner (preferably in the middle of the day)—a little soup, fish, slice of meat, and one vegetable; the dessert may consist of fruit or simple puddings. Supper—cold meat, broiled fish, bread and butter, and milk.

Jackson also calls attention to the recent French views regarding the dechloridization treatment of nephritis and to the observations of von Noorden and others who have shown that chemically there is little essential difference between the red and white meats. Red meat, which for years has been looked upon as harmful in nephritis, is now considered by many as a perfectly safe and even necessary article of food.

Thompson,² in writing of the dietetic treatment of nephritis, dismisses the acute forms, with the statement that an exclusive milk diet, bread and crackers with milk or farinaceous gruels are demanded. In the management of the chronic forms it is his belief that the dangers of

¹ Boston Medical and Surgical Journal, April 6, 1905.

² Medical Record, December 10, 1904.

eating meats are overrated and that there are certain types of the disease in which the moderate use of meat is positively demanded.

Thompson recommends red meat sparingly in the following cases: 1. Those of long standing in which the chief symptom is a moderate albuminuria. 2. Those in which anæmia and loss of weight and strength are the prominent features. 3. Those in which some associated disease makes the use of animal food desirable. In regard to this last class Thompson states that the dominant condition is the one to be considered, even though it may disregard the nephritis. Thompson¹ also considers the dietetic management of arthritis deformans, diabetes, lithæmia, arteriosclerosis, and gout. Numerous drugs have been recommended in the treatment of *arthritis deformans*, but, as Thompson states, the disease is best combated by dietetic measures. Forced feeding, as carried out in tuberculosis, gives the best results in these cases. The diet should consist largely of fatty foods with an abundance of meat to combat the anæmia. The ordinary meals should be reinforced by two or three lunches during the day, at which milk, eggs, broths, or meat-sandwiches are given. The digestion of these patients is not unusually impaired, but with care they will usually tolerate the forced feeding. Gastrointestinal disturbances can usually be corrected by the use of simple bitters before meals, hydrochloric acid, and nux vomica after meals, and the promotion of waste elimination by the use of a saline. An abundance of fresh air and sunshine is also of great benefit in arthritis deformans.

While not admitting the existence of *lithæmia* as a separate disease Thompson admits that there is a symptom-complex which renders the use of the term convenient. He pictures the lithæmic patient as one usually in middle life who, after leading an in-door or sedentary life, or after passing through a period of excessive mental strain and anxiety (especially of "worry"), complains of headache, insomnia, vertigo, "nervousness," irritability, and lassitude. They are constipated, have a furred tongue, and the urine, somewhat diminished in quantity, is loaded with proteid waste. The pulse is often small and hard. The history of the patient reveals the fact that he has been eating meat twice daily and sometimes three times. Thompson states that the treatment of this condition is simple and the results most satisfactory. Meat is prohibited absolutely for a week or ten days and the dietary made up from green vegetables, cereals, and fruits. Water is given freely; two glasses on rising, before each meal, and on retiring (sixty-five ounces in all) are sufficient. If a mental effect is desired some one of the well-known spa waters may be prescribed or an effervescing tablet of lithium carbonate may be added to each glass of water. Exercise is needed but

¹ Loc. cit.

should be taken in moderation, so as not to add physical to the mental exhaustion. The patient should also be instructed to spend as much time as possible in the open air, eat slowly, and lie down for half an hour before the principal meal of the day.

The dietetic management of *arteriosclerosis* is substantially the same as that of *lithæmia*. As the condition is not unusually met with in laboring men, rest before meals can hardly be advised. In these cases catharsis and diuresis to carry off waste products, regulation of the diet, and the drinking of more water and less alcohol is possible. If the *arteriosclerosis* is complicated by cardiac dilatation or myocarditis or by nephritis restriction of fluids in the former and an increase in the intake of fluids in the latter may be necessary.

Thompson believes that the rigorous diet formerly in vogue in the management of *diabetes* is not generally used at present. He is opposed to the various gluten substitutes for bread because they are unreliable and fail to satisfy the craving of the diabetic for bread. For these reasons it is best to allow the patient one or two thin slices of thoroughly toasted bread once or twice daily or a small baked potato. The potatoes are best given in the form of "Saratoga chips," as they apparently give more satisfaction to the patient, and besides, are cooked in fat.

It is his custom in a well-marked case to advise a total abstinence of starch and sugar for several weeks, and as the glycosuria subsides a small quantity of bread or potato may be given. Thompson believes in a limited amount of bread or potato, as the patient is less apt to commit harmful indiscretions. A mild case will do well on a diet principally of proteids with some carbohydrates and fat added, but in the more serious cases the amount of fat should be increased. In the most serious aspects of the disease when with an exclusive diet of proteids glucose continues to appear in the urine both the proteids and carbohydrates should be greatly reduced and fats increased as far as possible. The following dietary of fats is recommended for extreme cases: Butter (one-quarter pound daily), cream (one pint or more daily) diluted with water, cod-liver oil, olive oil, nuts of various kinds, sardines, eggs, bacon, fat ham, cheese, soups enriched with "dripping," mackerel, salmon, fat meat, such as goose and duck, and the tender fat of corned beef. Suet and lard should be freely used in cooking.

Gout, Thompson says, has had too many dietetic fads connected with it. While acute attacks of gout demand a simple dietary of milk and Vichy with simple gruels, the prophylactic treatment and the treatment of the chronic manifestations are best carried out on the following general principles: 1. To reduce the consumption of food as a whole. 2. To increase the consumption of water. 3. To eliminate entirely sugars and sweets of every kind, as well as alcohol. 4. To reduce the consumption

of red meats to a minimum. The common belief that Scotch whiskey is less injurious to a gouty individual Thompson characterizes as a fad. He states that much of the Scotch whiskey sold in this country is artificially flavored with creosote, and besides is quite as injurious as any other form of alcohol.

Watson¹ has carried out some experiments to determine the influence of an excessive meat diet in the production of *gout*. An exclusive raw meat and water diet fed to poultry and rats resulted in an hypertrophy of the thyroid gland and an alteration in the character of the secretion from the gland. He believes that as a result of an excessive meat diet there is established in many subjects an alteration in the character of the thyroid secretion, and that this defect can be remedied by the administration of thyroid gland. In fact, in two cases of inveterate chronic gout which had not been amenable to dietetic measures he obtained strikingly beneficial results from the administration of *thyroid extract*. In the treatment of chronic types of disease, especially those generally designated as gouty, rheumatic, or neurotic, Potts² recommends a purin-free diet. In this class of patients he would avoid meat, fish, tea, coffee, mushrooms, and asparagus as being the ones which contain purin bodies in an appreciable amount. He states that it must be remembered that though a vegetarian diet may be made purin-free, it is not the most desirable, as nutrition and vigor are maintained with difficulty. The staple food should be selected from milk, cheese, nuts, cereals, and fruit. Thorough mastication must be insisted on and the change in food must be made gradually, not more than one meal being altered at a time. The patients should be under constant supervision during the early days in order to avoid constipation and difficulty in digesting certain foods.

In the treatment of excessive *uric acid* in the urine Byron Robinson³ states that the diet should be mixed and for the most part vegetable in character. Cabbage, cauliflower, beans, peas, turnips, radishes, and spinach should be freely eaten in order that the sodium, potassium, and ammonium which they contain may combine with the free uric acid in the urine and form soluble urates. In addition Robinson uses an alkaline laxative tablet.

Additional information on dietetic measures in tuberculosis and skin diseases will be found in the present volume, pp. 39, 41, and 108.

Digitalis has occupied considerable space in the literature without, however, anything new being brought forward. Bradford⁴ calls attention to certain points which are too apt to be neglected. He states that

¹ Lancet, February 11, 1905.

² Ibid., June 17, 1905.

³ American Medicine, August 26, 1905.

⁴ Clinical Journal, July 27, 1904.

digitalis will not always produce slowing of the pulse, as this property of the drug depends entirely on the cause of the acceleration. In febrile conditions it has little influence in slowing the pulse, and the same may be said of acceleration due to nervous excitement. Its great field in reducing the pulse rapidity is in those conditions resulting from disease of the muscular mechanism of the heart.

Eichorst¹ believes that digitalis is indicated in any condition in which there is enfeeblement of the cardiac muscle such as valvular disease, myocarditis, chronic respiratory diseases, atrophic kidneys, acute infections, poisons, such as tea, coffee, tobacco, and emotional disturbances. He prefers the powdered digitalis in 1½-grain doses given with 15 grains diuretin three times daily. In some cases simple rest in bed with a milk diet is sufficient; if the heart does not respond in three days, however, he adds digitalis. He ordinarily employs the digitalis for ten days, but in certain cases continues it indefinitely in small doses.

Rouslacroix² in chronic diseases of the heart starts with the "digitalis test" (25 drops). If the myocardium does not respond to this test sparteine and strophanthus are used alternately for a week. After the heart has been steadied by this treatment digitalis is used in two large doses, and this is followed by rest and a milk diet. If the heart again fails the sparteine and strophanthus are resumed, followed by the digitalis. He cites instances showing how digitalis had failed at first and later had exerted its specific effect after the use of sparteine and strophanthus. Rouslacroix used digitalin, 1 mg. of the active principle being contained in 50 drops of an alcoholic solution.

Jones³ believes that the indications for digitalis in valvular disease are very limited. He says it should not be used in aortic regurgitation. While most observers state that digitalis is contraindicated in aortic insufficiency except in failing compensation, Jones states that it should not be used even then. He states that after careful study he is convinced that digitalis should be used in mitral insufficiency only, and then not until compensation has failed.

In the treatment of *pneumonia* Capuano⁴ advocates large doses of digitalis. Amucano⁵ believes digitalis is valuable in pneumonia because it increases the resisting power of the leukocytes. Manges,⁶ on the other hand, in writing on the treatment of pneumonia, states that the use of digitalis in large doses has not found much favor.

¹ Deutsche med. Wochenschrift, 1905, No. 2.

² Presse médicale, 1905, No. 1.

³ Journal of the American Medical Association, October 1, 1904.

⁴ Gazzetta degli Ospedali, 1904, No. 100; Abstract, Journal of the American Medical Association.

⁵ Ibid., 1904, No. 49.

⁶ Medical Record, December 10, 1904.

Digitalis, as is well known, should be used cautiously in *arteriosclerosis*. Von Openchowsky¹ reports a rather unique case in which as the result of disease of the right coronary artery the administration of digitalis produced marked disassociation in the action of the two ventricles.

Hall² calls attention to the frequency of hallucinations and delirium from the administration of digitalis. He believes that these symptoms are usually attributed to the disease from which the patient is suffering, when, as a matter of fact, the withdrawal of the drug will have the effect of abating the mental disturbances. He advises in all heart cases before deciding that the delirium is the result of the disease to first see what effect withdrawal of the drug will have.

Johnson³ records an instance of *digitalis poisoning* with low temperature without collapse. The patient, a woman, took two doses of the tincture, the amount of which was unknown. A few minutes after the second dose there was vomiting, diarrhoea, and epigastric pain. The pulse was 54 and the temperature 94°. The temperature remained low for several hours, but there was no air hunger, sweating, or weak pulse. She recovered under active stimulation.

Ergot. Clinically ergot is supposed to exert a marked influence on the bloodvessels, causing a persistent contraction. From an experimental investigation on animals, chiefly dogs, Sollman and Brown⁴ found that there is nothing pointing to a useful therapeutic action in modifying the circulation. This statement, however, is based entirely on experimental evidence, and the writers do not wish to be understood as denying the existence of the good results claimed by competent clinical observers.

Applegate⁵ believes in the use of ergot in *labor*. In his opinion it should be limited to or near the end of the third stage. It is best administered by mouth for the prevention of hemorrhage, while for the control of hemorrhage it should be given hypodermically.

Prüssman⁶ is also an advocate of the prophylactic use of ergot in labor. He employs *ergotine* hypodermically ten to fifteen minutes before the birth of the child. Prüssman advises the use of ergotine in all operative deliveries, multiple births, hydramnios, deformities, fibroid tumors, and in the first or second stages of labor when the pains are deficient or there is a history of hemorrhage during previous labors.

It has not been so many years ago that the almost universal teaching

¹ Berliner klin. Wochenschrift, 1904, No. 40; abstract, Journal of the American Medical Association.

² American Medicine, March 25, 1905.

³ New York Medical Journal, May 13, 1905.

⁴ Journal of the American Medical Association, July 22, 1905.

⁵ American Medicine, June 24, 1905.

⁶ Münchener med. Wochenschrift, January 10, 1905.

and practice was to administer ergot at the beginning of the third stage of labor.

Hare,¹ in commenting on this practice, points out that obstetric teachers are coming more and more to recognize the fact that labor is a physiological process and that the ordinary healthy woman has no need of such artificial aids. Furthermore, there is danger of locking up in the uterus clots and other materials which would be otherwise expelled; another point to be borne in mind is the fact that the ergot when given at the beginning of the third stage probably does not exert any influence until some time later, when it only serves to aggravate and increase the "after pains" by the powerful uterine contractions. Its employment to overcome *uterine inertia* is not good practice, as it may produce serious damage from the powerful uterine contractions. Besides, there are other methods of overcoming uterine inertia which are perfectly safe, namely, the hypodermic use of strychnine or by the use of a little cocaine or the wine or fluid extract of kola. These substances act by stimulating the exhausted system and thus furnish sufficient energy to complete the physiological process.

Hooper,² in an article on ergot, takes practically the same stand, and while he would not entirely discard it the occasions when he would use it would be very few. Hooper calls attention to a practical point in regard to hemorrhage during labor, and that is the necessity of ascertaining its source. He cites instances where torn vessels in the cervix, clitoris, vagina, or perineum were the sources of the hemorrhage. He cautions against the use of ergot in patients with renal inadequacy, albuminuria, or a diminished output of urea.

Eustace Smith's³ plan of treating *chorea* with large doses of ergot was commented on last year. Riviere⁴ writes favorably of this method. The fluidextract of ergot was given in doses of a drachm to a drachm and a half three times daily. Riviere states that there were no symptoms of poisoning from these doses nor did he detect any physiological effects, such as arterial spasm, increase of pulse tension to palpation, or accentuation of second aortic sound. This by the way is in confirmation of the experimental results obtained by Sollman and Brown.⁵ Riviere found that still better results were obtained by adding 3 minims of liquor arsenicalis to each dose of the ergot. The *arsenic* can be increased as desired.

Chase⁶ asserts to have obtained good results from the internal use of

¹ Therapeutic Gazette, September 15, 1905.

² Australasian Medical Gazette, February 20, 1905.

³ PROGRESSIVE MEDICINE, December, 1904, p. 323.

⁴ British Medical Journal, February 18, 1905.

⁵ Brooklyn Medical Journal, November, 1904.

⁶ Loc. cit.

ergotine in the treatment of *cerebrospinal meningitis*. In case of vomiting he gave the drug hypodermically. The average dose employed was 3 grains (equal to 30 grains of ergot) every hour.

Eserine has long been recognized as a drug possessing some value in preventing *meteorism* and *intestinal paresis*. Craig¹ has found it very useful in the after-treatment of *abdominal sections*. He recommends it in form of the salicylate in $\frac{1}{80}$ gr. doses, which may be repeated if necessary, or if there has been chronic constipation the dose may be doubled or trebled. Craig advises that *atropine* be used in conjunction with the eserine, as the former antagonizes the undesirable effects of the latter. One one-hundredth of a grain of the atropine is given by mouth an hour before the anæsthesia, first because it is slower in action than the eserine, and secondly, because it is an aid to the anæsthetist in that it prevents excessive pharyngeal secretion so common during the early inhalations of the ether. If there is not time to administer the atropine by mouth $\frac{1}{80}$ grain is given hypodermically immediately before the anæsthesia. He advises the use of a fresh solution of eserine, as many of the stock tablets were found to be inert.

Since he has been using eserine Craig has had to use less morphine or codeine for pain unless it was distinctly extra-abdominal. In such cases the morphine can be used with greater freedom, as there is less danger of producing constipation.

Formaldehyde. This substance is at present largely used as a disinfectant and preservative and is little employed medicinally. Fischer² from experimental observations states that *formalin* (40 per cent. formaldehyde) is an extremely irritant poison capable of producing a destructive action upon all of the viscera with which it comes in contact, and that no matter how it is introduced into the body (whether by direct injection or inhalation) it will produce a mild or severe degree of cloudy swelling in the parenchymatous organs. He also states that the inhalation of formaldehyde vapor, even in small quantities, is followed by bronchitis and pneumonia, the latter being due to the inhalation and not to secondary infection. While these observations may be perfectly true in regard to animals, the inhalation of formalin vapor certainly does not produce bronchitis or pneumonia in man. On the contrary I have employed during the past year formalin inhalations in the treatment of coryza and the early stages of bronchitis with very good results. In the early stages of a "cold," when the nasal mucous membrane is swollen, accompanied by a feeling of fulness in the head and the throat is dry and irritated, the use of a gargle (composed of chlorate of potassium and

¹ New York Medical Journal, March 18, 1905.

² Journal of Experimental Medicine, February, 1905.

tannic acid) and formalin inhalations not only give great relief but will not infrequently abort the attack.

The formalin inhalations are given as follows: Ten drops of formalin are placed on a piece of absorbent cotton and the vapor gently inhaled through the nose. This amount of formalin will give off vapor for from eight to ten minutes. The cotton may be wrapped about the end of a pencil or penholder and should be about the size of an English walnut. The inhalations are given night and morning. Prolonged exposure to the vapor of formalin will often produce headache, but I know of no case of bronchitis or pneumonia among pathological workers where exposure often lasts several hours.

Rosenberg¹ does not believe formaldehyde to be a highly poisonous or corrosive substance. He states that when properly administered, so far from having any harmful effect, it usually proves beneficial. It is best administered in tablet form, each tablet containing 1 cg. in combination with sugar, menthol, and a little pepsin, hydrochloric acid, and aromatic vehicle. The tablet should not be swallowed whole but taken either in solution or held in the mouth and chewed.

Rosenberg claims to have obtained good results from the drug in *diphtheria*, *scarlet fever*, *erysipelas*, *cystitis*, and *tonsillitis*. He has also had some success with it in *tuberculosis*, and thinks it might be used with advantage in typhoid fever.

Galewsky² has made a study of the changes in the skin and nails following exposure to formaldehyde. The changes occurred mostly in laboratory workers and usually followed long after the exposure to the formalin; in some instances six to nine months elapsed between the exposure to the formaldehyde and the appearance of the lesions. The first change noted was a brownish discoloration of the nails followed by softening, painful splintering, and thickening in the neighborhood of the matrix. The changes may be limited to the nails or involves the skin in the form of an eczematous eruption which may extend as far as the wrist-joint. The skin eruption is accompanied by inflammatory oedema and vesicle formation. The nail changes in ordinary eczema differs from the above in that the nails are hard and brittle. Pain of a burning and boring character in the ends of the fingers and nails was complained of by most of those affected. The condition may last for as long as a year or even longer. As formalin has been recommended in the treatment of hyperidrosis care should be exercised lest this obstinate affection is produced.

¹ Therapie der Gegenwart, 1905, No. 2.

² Münchener med. Wochenschrift, January 24, 1905; abstract, Journal of the American Medical Association, 1905.

Hamamelis Virginiana. Coston¹ recommends this drug in a variety of conditions. He states that it is a tonic, astringent, hæmostatic, anti-septic, and vascular sedative.

As a local application it is of value in *sprains, bruises, fissure in ano, ulcers, and varicose veins, phlegmasia alba dolens, eczema, and the poison of toxicodendron.* It is also of value in the treatment of cases of *capillary oozing.* For the treatment of sore and bleeding gums, relaxed uvula, or oval ulcers the following formula is recommended:

R—Ext. hamamelidis,
 Aquæ rosæ aa f ʒiv.
 M. Sig.—To be used as a mouth wash.

Owing to its sedative properties it may be used with advantage as a dressing for burns, herpetic eruptions, and articular rheumatism; in the latter instance it is applied with thorough friction. Its astringent properties render it of service in the treatment of hyperidrosis.

In the treatment of ulcers and varicose veins Coston recommends the fluidextract in full strength or combined with one-fourth the amount of glycerin or olive oil. For congested hemorrhoidal vessels hamamelis is of service in the form of a suppository.

R—Ung. hamamelidis,
 Ung. stramonii aa gr. x.
 Ol. theobromæ q. s.
 M. Ft. suppos. No. i.
 Sig.—One such suppository night and morning after cleansing the bowels.

Adler² recommends hamamelis locally for *pruritus ani.* The drug is used as follows:

R—Ext. hamamelidis f ʒj.
 Ext. ergotæ fl. f ʒij.
 Ext. hydrastis fl. f ʒij.
 Tr. benzoini co. f ʒij.
 M. Sig.—1 to 2½ drachms to be injected into the rectum once daily.

In the treatment of this very obstinate condition the exciting cause must be removed if possible and the patient's general condition improved by hygienic and dietetic measures. Adler further points out that if the perineal skin is tough and dry the entire surface should be painted over with a concentrated solution of silver (96 grs. to the ounce). This application may have to be repeated several times. After the skin has been restored to the normal citrine ointment should be applied in full strength daily for two weeks and then two or three times a week. The treatment may extend over a period of several months. Coston³ states that hamamelis is valuable internally in the treatment of *hæmoptysis, hæmatemesis, menorrhagia, metrorrhagia, and especially hæmaturia* in half-drachm

¹ Therapeutic Gazette, 1905.

² American Medicine, 1905.

³ Loc. cit.

doses. In hæmatemesis it may be combined with a solution of adrenalin while in hæmoptysis it may be used to advantage with ergot and digitalis.

Hamamelis is recommended by Shoemaker¹ in cases of acute *dysentery*. He prescribes it as follows:

R—Ext. ergotæ fl.,
 Ext. hamamelidis fl. aa f ʒ iss.
 Elix. guaranæ f ʒ ij.
 M. Sig.—Two teaspoonfuls in water every two or three hours.

He has also found the hamamelis ointment serviceable in the treatment of *burns*, *erysipelas*, *eczema*, and *herpes*.

Heroine. Two cases of heroine addiction, one reported by Atwood² and the other by Montagnini,³ are of especial interest inasmuch as this drug has been recommended as perfectly safe and free from the danger of producing a habit. In giving heroine the same precautions should be taken against the renewal of the prescription as are observed with morphine.

Hydrastis has little popularity at the present time and is not much used. W. B. Stewart⁴ states that individuals with a poor appetite, slight nausea, and occasional vomiting will do well with proper regulation of the diet and the use of the fluidextract of hydrastis. The drug is given in doses from one to six drops in water an hour before each meal and at bedtime. Small doses of hydrastis are also efficient in *enterocolitis*.

For the control of various hemorrhagic conditions as *menorrhagia*, *epistaxis*, *hæmoptysis*, *hæmatemesis*, and *hæmaturia* Stewart recommends hydrastininæ hydrochloras in doses of one-fourth of a grain. Caution is necessary when employing this preparation in pregnant women, as there is danger of abortion.

At one time quite popular in the treatment of *gonorrhæa*, hydrastis is now little used. For local use Stewart states that the best preparation is the glyceritum hydrastis. Subacute or chronic *vaginitis* or *urethritis* and some forms of leucorrhœal discharges are often greatly benefited. Hydrastis should not be used in the acute stages of *vaginitis* or *urethritis*. The glyceritum hydrastis diluted with three or four parts of water forms a very efficient nasal spray in cases of chronic *nasal catarrh*. A decided objection to its use locally is the tendency to staining.

Hyoscine. The remarkable results obtained by hyoscine in the treatment of drug habits were given in PROGRESSIVE MEDICINE December, 1904, p. 326. Wagner⁵ has contributed an article favorable to its use.

¹ Journal of the American Medical Association, March 11, 1905.

² Medical Record, June 3, 1905.

³ La Riforma Medica, August 30, 1904.

⁴ Journal of the American Medical Association, November 5, 1904.

⁵ Cleveland Medical Journal, June, 1905.

He states that combined with atropine it is antagonistic to the morphine and cocaine habits and will abolish the craving for these drugs in from seventy-two to one hundred and forty-four hours without any suffering or inconvenience on the part of the patient. He cautions against leaving the patient alone and that a nurse should be in constant attendance during the active treatment. A course of rest and tonic treatment should follow the active treatment. Wagner found hyoscine of little value in the treatment of alcoholism.

Iodide of Potassium. Hühner¹ has contributed a very practical article on the best method of administering potassium iodide. He advises that the drug be always given in solution, well diluted, and never on an empty stomach. Milk is the best vehicle for its administration, although compound syrup of sarsaparilla is often preferable for disguising the taste. Any of the mineral waters or ordinary pure water can also be used. Each dose should be further diluted by half a glass of water or milk. Many of the ill effects of the drug may be traced to a poor preparation. It is also to be remembered that while small doses may cause untoward symptoms an increase in the dosage may have no bad effect. Pustulation of the skin may be largely avoided by strict cleanliness of the skin when the drug is taken internally. The well-known fact that calomel should never be dusted in the eye of a patient taking iodide of potash is also recalled.

In regard to the making of a solution of iodide of potash Hühner states that it is a difficult matter to make a solution of which 1 minim equals 1 grain. As druggists are not apt to take the time and trouble necessary he advises the use of a 50 per cent. solution (two drops of the solution equalling one of the drug).

In connection with the question of inaccuracies in the dosage of iodide of potassium in saturated solutions the experience of Healy² is interesting. He found that 4 drachms of potassium iodide added to 3 fluidrachms of distilled water gave a mixture of $4\frac{1}{2}$ drachms, but that this at room temperature (70°) was not a saturated solution, as almost another drachm of the iodide of potash could be dissolved. This brought the mixture up to 4 drachms, of which 1 minim was practically 1 grain of the drug. It was in the matter of drops and household measures, however, that the greatest discrepancies were found. Thus measured by a medicine dropper sixty drops equalled from 28 to 40 minims while from an eye pipette sixty drops equalled 46 to 49 minims. While these measures are far below what is ordered, the ordinary teaspoon erred in the opposite direction, one teaspoonful containing from 85 to 95 minims. It will thus be

¹ New York Medical Record, April 1, 1905.

² Journal of the American Medical Association, January 14, 1905.

seen that measured in one way but half the required amount of the drug may be given, while by the other method nearly twice as much is taken. As Healy says, under the present methods when it is thought 120 grains are being taken, in reality it may be 110 grains or 90 grains or 160 grains.

Hühner¹ calls attention to a fact that is too little heeded, namely, that iodide of potassium should never be given in tuberculosis or when there is a suspicion that tuberculosis may be present. He states that its irritating effect on the bronchial mucous membrane is a decided objection. It may also be added that there is considerable clinical authority that iodide of potash will cause a rapid breaking down of a tuberculous lung. When syphilis and tuberculosis are present in the same patient the iodide may be used to advantage.

According to Hühner iodide of potassium should never be used in primary *syphilis* nor in the secondary stage until the patient has had at least six months of mercurial inunctions unless tertiary symptoms occur early and threaten some important organ, as the brain or eye. After a patient has been six months on mercurial inunctions the iodide is given as follows:

R—Hydrargyri iodidi rubri gr. ss.
 Potassii iodidi gr. cxxviiij.
 Syr. sarsaparillæ co. f ʒj.
 Aquæ q. s. ad f ʒij.

M. Sig.—1 fluidrachm three times a day, after meals, well diluted.

After a few weeks with this mixture Hühner prescribes the iodide alone in doses of 10 to 25 grains t. i. d. The mercurial inunctions are kept up at intervals for another six months. The iodide is then administered as follows:

R—Potassii iodidi ʒ viij to ʒ x.
 Syr. sarsaparillæ co. f ʒj.
 Aquæ q. s. ad f ʒij.

M. Sig.—1 fluidrachm in half a glass of milk or water after meals.

When the iodide is given simply for its specific effect and not to counteract any particular symptom the drug is stopped at the first evidence of iodism.

When given to combat the ravages of tertiary syphilis, however, the drug is pushed and not stopped for skin pustulation or rhinitis. Hühner states that under these circumstances an increase in the dose will often cause a disappearance of symptoms of poisoning, and even if they do get worse it is more important to get the system saturated with the iodide than to worry over the pustulation or rhinitis. In giving large doses Hühner pursues the following plan: A 50 per cent. solution is used (2 drops equals 1 gr.). First day 20 drops in the morning, 22

¹ Loc. cit.

drops at noon, 24 drops in the evening; second day 26 drops in the morning, 28 drops at noon, 30 drops in the evening. By increasing the dose in this way he has rarely seen any ill effects from the drug and seldom has to discontinue it on account of unpleasant symptoms. He states that he has two patients at present taking 500 and 600 grains daily without any annoying symptoms.

In the treatment of *arteriosclerosis* Bar¹ recommends the free use of the iodine compounds and thyroid extract, as they both increase the metabolic activity.

Romberg² quotes the work of Müller and Inada, who found that the administration of small doses of iodide to healthy young men caused a marked diminution in the viscosity of the blood. This fact, he believes, explains the therapeutic effect of the drug in *arteriosclerosis* as the greater fluidity of the blood is equivalent to a dilatation of the vessels since it flows more rapidly. Romberg also believes that this effect explains why the drug should be long continued in order to be of value.

In the treatment of pulmonary *emphysema* the following formulæ³ may be used:

- R.—Potassii iodidi 3j.
 Tr. hyoscyami f 3ij.
 Elix. calisayæ q. s. ad f 3ij.
 M. Sig.—One teaspoonful every three hours in water or milk.
- R.—Potassii iodidi 3ss.
 Tr. belladonnæ f 3ss.
 Spt. ætheris comp. f 3ss.
 Aquæ q. s. ad f 3ij.
 M. Sig.—One tablespoonful three times daily in water after food.

In the treatment of *acute rheumatism* iodide of potassium may be combined with the salicylates as follows:

- R.—Potassii iodidi 3ij.
 Sodii salicylatis 3ss.
 Spt. ætheris nitrosi f 3j.
 Syr. aurantii f 3iiss.
 M. Sig.—One to two teaspoonfuls every two hours, well diluted in water.

The *iodide of silver* is recommended by Siter and Uhle⁴ in the treatment of *urethritis*. It is not claimed that this drug will render urethritis a trivial complaint, but it is stated that it is extremely serviceable in the acute stages and relieves the symptoms at this period almost immediately. The drug is suspended in a 5 per cent. solution of quince-seed mucilage. It causes no burning or irritation and can thus be used in stronger solu-

¹ British Medical Journal, January 14, 1905.

² Deutsche med. Wochenschrift, November 24, 1904.

³ Journal of the American Medical Association, April 22, 1905.

⁴ University of Pennsylvania Medical Bulletin, 1905.

tions than other silver salts and has the additional advantage of not staining.

Iodoform. Rossini¹ reports a case of *tuberculous cerebrospinal meningitis* which recovered from the use of iodoformed oil. He withdrew from 1 to 5 c.c. of cerebrospinal fluid and injected into the subarachnoid space an equal quantity of a 1 per cent. iodoformed oil. This procedure was repeated every six hours. In addition he injected into a vein every second day 1 c.c. of a solution containing 15 grains of iodine, 60 grains of potassium iodide, and 3 ounces of water.

Dewar² claims to have obtained good results in advanced *pulmonary tuberculosis* from the intravenous injection of iodoform. He uses an ethereal solution of iodoform to which is added a little liquid paraffin.

Two years ago Pryor³ published a very complete paper showing the value of iodine in *puerperal sepsis*. He obtained the iodine effect by packing the pelvis with iodoform gauze. Burtenshaw⁴ reports favorably on this method in a case of postoperative sepsis. Twice daily, after irrigating the peritoneal cavity, 2 drachms of a 10 per cent. solution of iodoform were injected through the drainage tube. Later the tube had to be removed and the iodoform was used twice daily in the form of vaginal suppositories (1½ drachms). In addition a half an ounce of an iodine-fat combination was injected high into the bowel every three hours during the day. He also used iodoform suppositories in the uterine cavity. The author also calls attention to the observation of Yeo that iodine in the form of iodoform is readily absorbed from the skin. Yeo has reported cases of *tuberculous peritonitis* successfully treated by making daily applications to the abdomen of an ointment containing equal parts of iodoform and cod-liver oil.

Pugh⁵ recommends the iodine treatment for *infected wounds*. He uses the *tincture of iodine*, which is applied by means of a swab made by twisting a piece of cotton around a toothpick. Pugh mentions the following class of cases best adapted to the local use of iodine: *scalp wounds*, *ulcers of the leg*, *inguinal adenitis*, and *vaginitis*. In the treatment of gonorrhœal vaginitis it is particularly valuable. He has also used iodine successfully in the various forms of surgical tuberculosis.

Iron. Knott,⁶ in an article on the therapeutic virtues of iron, calls attention to some important points in regard to its administration. The excessive use of iron leads to a distressing plethora which is further aggravated by the constipation present. This condition is known as

¹ La semaine médicale, 1904, No. 44.

² British Medical Journal, January 14, 1905.

³ New York Medical Journal, January 23, 1904.

⁴ American Medicine, March 11, 1905.

⁵ Ibid., October 15, 1904.

⁶ Ibid., December 17, 1904.

siderismus. The symptoms of this condition are violent pulsation of the arteries, especially the carotids, headache, cardiac palpitation, feverishness, flushed face, and injected conjunctiva. There are in addition epigastric pain, with a sense of fulness and weight, furred tongue, anorexia, and occasional colicky pains. Knott states that when there is disease of the gastrointestinal mucous membrane iron will produce a severe diarrhoea or aggravate the symptoms already present. He states that the failure of iron in anæmia may sometimes be attributed to this fact. Experimental investigation has also shown that iron has an irritating action on the intestinal mucous membrane. Because of this irritating tendency of the iron Knott says it should not be used when there is organic intestinal disease in the early convalescent stage of typhoid fever, and dysentery, and in tabes mesenterica and pulmonary tuberculosis.

In the treatment of *chlorosis* iron is practically a specific, although not so reliable in other forms of anæmia. To ensure the best results from iron a free action of the bowels must be secured, and in addition its combination with arsenic seems to increase its blood-making power. Knott also refers to the use of sulphate of iron in septic conditions, the hæmostatic power of certain of the salts and the antidotal properties of the precipitated ferric oxide in arsenical poisoning.

Clark¹ after experimenting with several combinations of iron in treating chlorosis found that Blaud's pill was after all the most satisfactory.

Latham² calls attention to the well-known value of *perchloride of iron* in *sepsis*. In regard to its use in *diphtheria* there is still some question as to whether this iron preparation should be used with antitoxin or independently of it. If used independently it still remains to be seen at what stages of the disease one or both should be administered.

Robson³ adds *iron acetate* to the list of drugs supposed to have a favorable influence on pneumonia. In severe cases the acetate of iron was alternated with strychnine.

Isopral. This new hypnotic is believed by Stoner⁴ to be superior to chloral in activity, and that, furthermore, it is without any of the latter's depressing phenomena upon the circulatory or respiratory functions. Isopral occurs as a colorless, shining crystalline powder, slightly soluble in water. It has a slightly burning taste and a characteristic pungent odor. Stoner recommends that the drug be given in capsules or wafers in the dose of 10 to 15 grains.

Lead. The following articles show the numerous ways in which poisoning may occur from lead. Lewin,⁵ who has made elaborate

¹ Medical Times, 1904.

² Lancet, November 19, 1904.

³ British Medical Journal, April 15, 1905.

⁴ New York and Philadelphia Medical Journal, March 25, 1905.

⁵ Berliner klin. Wochenschrift, 1904, No. 41.

studies of industries producing *lead poisoning*, found that it was more common in women than men when both are equally exposed. Among other interesting points he found that of 81 women examined there had been 123 pregnancies with but 14 living children. Abortion is frequent and the death rate among children born living is very high. Hall¹ states that within recent years the abortifacient property of lead has become pretty generally known among the laity in certain parts of England. As a result numerous cases of plumbism are occurring among women who have sought to produce an abortion by taking pills containing lead. In some instances the poisoning has been acute in character, but the majority are chronic as the result of the small quantities of lead contained in the quack "female irregularity" pills. Lefour² reports an instance of lead poisoning in a woman during pregnancy. In this case the source of the lead was the wall-paper. In her first pregnancy the fetus was born dead and in the second the child was born prematurely and was very feeble. Lewin³ in another contribution on lead poisoning among industrial workers states that the lead has a particularly bad effect on the eyes. Among the eye disturbances noted were transient blindness, atrophy of optic nerve, retinitis with albuminuria, paralysis or cramps of the ocular muscles, and corneal opacities. Lewin states that there is a long interval between the changes which could be recognized by the ophthalmoscope and those of which the patient first complains.

Miller⁴ has reported two instructive cases which emphasize the necessity of exercising care when administering lead internally. In both instances capsules containing lead acetate were given for a diarrhoea. In one case a capsule containing 1 grain of lead acetate among other ingredients resulted in the production of chronic plumbism. In the second case capsules containing 2 grains of lead, of which twenty-three were taken, produced acute manifestations of lead intoxication. Recovery occurred in both cases.

Mercury. The intramuscular therapy of *syphilis* has been fully considered by Dr. Gottheil in the September issue of *PROGRESSIVE MEDICINE*, p. 135. Additional articles have been published in favor of this method by Lannois,⁵ Kilbane,⁶ Sinclair,⁷ and Schnabel.⁸ Faure⁹ also recommends this method in treating nervous diseases of syphilitic origin.

¹ British Medical Journal, March 15, 1905.

² L'obstétrique, July, 1904.

³ Berliner klin. Wochenschrift, December 12, 1904.

⁴ Therapeutic Gazette, August, 1904.

⁵ Lyon médicale, October 30, 1904.

⁶ Medical Record, July 29, 1905

⁷ New York Medical Journal, October 22, 1904.

⁸ Deutsche med. Wochenschrift, 1904, p. 1893.

⁹ Lancet, December 10, 1904.

Hutchinson¹ adheres to the internal administration of mercury in treating syphilis. He prefers the hydrargyrum cum creta in doses of 1 to 2 grains frequently repeated. For the prevention of diarrhœa 1 or 2 grains of pulv. ipecacuanha co. should be combined with each dose of mercury. The mercurial course should be kept up uninterruptedly for from one to two years.

Hollen² recommends the *nucleide of mercury* as the best preparation.

Almkvist³ believes that *mercurial stomatitis* is generally due to the presence of decaying matter and of tartar on the teeth. For the prevention of this condition he recommends the following tooth paste:

Potassium chlorate	36 parts.
Sodium benzoate	3 "
Sapo albus	4 "
Sodium biborate	8 "
Glycerin	8 "
Etherol	1 "

The etherol is added to flavor the paste. The use of the paste may be preceded by rinsing the mouth with a little alcohol. The tartar should be removed by a dentist.

McAlister⁴ and Snively⁵ both speak favorably of *calomel* as an intestinal antiseptic. Snively states that the calomel under these circumstances is best prescribed in the form of a triturate containing $\frac{1}{10}$ grain of calomel and 1 grain of sodium bicarbonate.

Lesignoli⁶ recommends calomel in cardiac and hepatic dropsy because of its diuretic properties. The calomel is administered in $2\frac{1}{2}$ -grain powders three or four times daily. Salivation must be guarded against.

The *Berliner Allgemeine Medical Zentral-Zeitung* of August 6, 1904,⁷ cites the case of a woman six months pregnant in whom mercurial inunctions, given for secondary syphilis, produced intense enteritis. The symptoms disappeared upon withdrawal of the drug but promptly returned when the inunctions were resumed. Six weeks after she was delivered the inunctions were continued without any ill effects. The diarrhœa was attributed to swallowing the saliva, which was very profuse. The teeth were in very bad condition.

Toff⁸ points out the dangers of *bichloride* solutions in puerperal women. In some cases the toxic effects are manifested by gastrointestinal dis-

¹ Berliner klin. Wochenschrift, September 12, 1904.

² Medicine, February, 1905.

³ Hygiea, Stockholm, 1905, Nos. 9 and 10; abstract, Journal of the American Medical Association.

⁴ Therapeutic Gazette, October 15, 1904.

⁵ Pennsylvania Medical Journal, 1904.

⁶ Il Policlinico, 1904, No. 67; abstract, American Medicine.

⁷ Abstract, Medical Record.

⁸ Berliner klin. Wochenschrift, December 5, 1904.

turbances, and the diarrhoea which sets in several days after labor may also be associated with prostration, collapse, colic, etc. Errors in diet are supposed to be responsible, and it is only the appearance of oral symptoms that directs attention to the bichloride douches. When the kidneys are attacked the condition is more serious. Besides the appearance of albuminuria puerperal fever may be simulated by the chills, fever, scanty lochia, etc. When the real cause is discovered the douches should be stopped at once and irrigations of normal salt solution used. Owing to the susceptibility of patients to this preparation Toff recommends very dilute solutions, 1:6000 to 1:10,000, and that in addition the douche should be followed by an irrigation of normal salt solution to wash out any of the bichloride which remains. The presence of renal or intestinal disease contraindicates the use of bichloride.

Mushroom Poisoning. Berry¹ has contributed an excellent article on "Mushroom Poisoning." Although there are a number of poisonous mushrooms, nearly all the fatal cases are caused by one of three varieties—viz., the *amanita muscaris* or fly mushroom, *amanita verna*, and *amanita phalloides*. The fly mushroom is found during the summer along roadsides at the edge of fields and in groves. It does not occur in the grassy pastures preferred by the common mushroom. This mushroom varies from a yellow to a bright orange or red, and on the surface are a number of warty scales which can be easily scraped off. The poison cup or *amanita phalloides* grows in the woods and on the borders of fields and does not grow in meadows. The cup is usually pure white and when wet is slimy and has a peculiar rank odor. "As a general rule, beware of those fungi that have little white gills, hollow stems, and sit in a socket, or are bulbous." Berry also advises the rejection of all mushrooms that are the slightest bit decayed or are worm-eaten.

After the ingestion of poisonous mushrooms symptoms may appear very shortly or be delayed for as long as twelve hours. The attack is ushered in by colicky pains, nausea, and vomiting and purging; in addition, the pulse becomes slow and thready, the respiration short and labored. The pupils are contracted, and there is dimness of vision. Later, the pupils become dilated, the extremities cold and moist, and the patient becomes stuporous. In fatal cases the heart becomes weaker and weaker, death finally resulting from paralysis of the heart. *Atropine* given in any but the final stage is the antidote. The atropine should be continued until marked physiological action is produced. A non-depressing emetic, such as sulphate of zinc, should be used, although it is not often necessary, as usually all the undigested particles have been vomited. As these patients are usually profoundly shocked, they should be kept quiet in

¹ Pennsylvania Medical Journal, November, 1904.

bed, the heart stimulated by digitalis, brandy, or ammonia and external heat applied about the body. Berry states that if heroic measures are applied and the patient carried over the crisis there is a good chance of his recovery.

Neuronal, one of the newer hypnotics, is not very favorably looked upon by Euler.¹ He employed it in doses of from 15 to 45 grains, but does not advise its use because of its lack of reliability and also from the fact that patients become accustomed to its use. The drug is also not without disagreeable after-effects such as vomiting, diarrhoea, and dizziness. Neuronal is of no value for the relief of pain.

Nitroglycerin has been the subject of a number of contributions during the past twelve months. Attention has been previously called to the rapidity with which most individuals become accustomed to this drug.

D. D. Stewart² has reported several cases in which enormous doses of the drug have been taken—in one instance 5 minims of the pure drug and in another 20 minims. He states that while these large doses, when reached gradually from small initial doses, are apparently harmless, they are not advisable. When employed for the reduction of arterial pressure nitroglycerin should not be relied on alone but due attention should be paid to the dietary and the emunctories. Allbutt has also recently called attention to this point in the prevention of apoplexy. While recognizing the importance of vascular sedatives he places more reliance on diet and the mode of life in dealing with increased arterial tension.

Hare³ does not agree with Stewart as to the harmlessness of large doses of nitroglycerin. He believes that large doses continued over a long period of time will cause both loss of sexual power and loss of vesical control.

Hare also calls attention to two practical points in the administration of the drug—one is the combining of digitalis or strophanthus with the nitroglycerin after pressure has been lowered in order to stimulate the tired heart, the other point is the administration of the drug in chronic cases in a form which is slowly absorbed. This can be accomplished by the use of compressed tablets or gelatin-coated pills rather than the easily absorbed hypodermic tablets.

Loomis⁴ from clinical and experimental observations believes that the ordinary dose ($\frac{1}{100}$ grain) is useless, as it is extremely transient in its effect and has little influence on the arterial pressure. He recommends $\frac{1}{80}$ grain as the minimal dose. Nitroglycerin has long enjoyed a reputation for increasing the urinary output in Bright's disease. Loomis,

¹ *Therapeutische Monatshefte*, 1905, No. 4.

² *Journal of the American Medical Association*, May 27, 1905.

³ *Therapeutic Gazette*, August 15, 1905.

⁴ *Medical Record*, March 18, 1905.

however, states that although he was constantly on the lookout for this evidence he was never able to satisfy himself that it was true. He believes that the drug's true field of usefulness is in those conditions due to arterial spasm such as *angina pectoris*, *migraine*, and *asthma*, when it should be given in full doses frequently repeated.

Binz,¹ in an investigation with nitroglycerin tablets, found that some of them were almost inert. In order to ensure accuracy and positive results he advises the use of an alcoholic solution of from 1 to 4 per cent. The dose of these solutions may be one drop gradually increased. Von Noorden² also advises the use of solutions in order to obtain satisfactory results. Since he has been using the drug in solution his results have been more constant and safer than when tablets were employed. Von Noorden begins the administration of the drug with a small dose and gradually increases it to $\frac{1}{8}$ grain or even $\frac{1}{4}$ grain in twenty-four hours. He has never noted any untoward symptoms. By giving the drug in this form and in this manner he has reduced the blood pressure from 220 or 180 to 100 or 120. The blood pressure not only remains low during the use of the drug, but frequently stays low for eight or even twelve days after it has been discontinued. After an interval the drug may be resumed again. Stewart³ called attention to the fact that after an interval of rest a much smaller dose could be given when the drug was resumed.

McLaughlin⁴ gives the following directions for treating *pulmonary hemorrhage*: Immediately on the occurrence of the hemorrhage $\frac{1}{100}$ gr. of nitroglycerin and $\frac{1}{4}$ gr. of morphine are given hypodermically. Adhesive strips are applied to the side from which the hemorrhage comes and the patient is instructed to lie on that side. Six hours after the occurrence of the hemorrhage the patient is put out-of-doors. This latter fact McLaughlin considers very important. At the end of four days the straps are removed and the patient is given a week of rest cure in the open.

Nitroglycerin alone has been employed for some years past in the treatment of hæmoptysis and its use was originally proposed, I believe, by Flick. When used alone it is given in $\frac{1}{100}$ grain doses every hour for six doses and then continued in $\frac{1}{100}$ gr. doses three times a day for several days.

Elvy⁵ has found nitroglycerin of value in certain surgical conditions. He recommends the drug in incipient *gangrene* and in all cases in which there is an impaired circulation with contracted arterial walls. He has also found it of advantage in local congestions.

¹ Therapie der Gegenwart, 1905, No. 2.

² Quoted by the Journal of the American Medical Association, October 22, 1904.

³ Loc. cit.

⁴ Medical Record, September 17, 1904.

⁵ British Medical Journal, January 7, 1905.

Wherry¹ gave nitroglycerin a trial in the treatment of *erysipelas*. The results were surprisingly good, although the number of cases in which it was used is far too small to carry much weight. Wherry claims that the nitroglycerin caused a reduction in the temperature, moist skin, good appetite, steady pulse, and an absence of prostration. There was also a general feeling of comfort and a fairly rapid disappearance of the inflammatory process.

Olive Oil. In the treatment of certain forms of *constipation* Herschell² states that excellent results may be obtained by olive-oil injections. It is not to be used in the constipation resulting from improper food. The best results are obtained in the constipation depending on a chronic colitis or as a result of spasm of the bowel, such as occurs in neurasthenics. From three to ten ounces of warm oil are given at bedtime and the amount and frequency of giving it gradually reduced until the minimal amount necessary is found. The apparatus necessary is a glass funnel to which is attached a rubber tube twenty-seven inches long. To the other end of the tube is attached a nozzle with a rounded end to prevent injury. Both the tube and nozzle should be of large calibre to ensure the ready passage of the oil. The oil is heated by standing the funnel containing it in a basin of hot water. The oil is retained all night, the bowels being evacuated after breakfast the following morning.

Opium. The almost universal method of treating *pulmonary hemorrhage* is by the hypodermic use of *morphine*. Small single hemorrhages require no treatment aside from absolute rest, but with large hemorrhages or small hemorrhages frequently repeated morphine administered hypodermically is the best single drug. In addition to the morphine McLaughlin³ gives *nitroglycerin* ($\frac{1}{100}$ gr.) and straps the side from which the hemorrhage comes.

Hyslop-Thompson⁴ has the patient's head and shoulders raised, gives a $\frac{1}{2}$ to $\frac{3}{4}$ grain of morphine hypodermically and injects into the rectum 30 to 40 grains of *calcium chloride* dissolved in a little water. In addition an ice-bag is placed over the affected side and heat is applied to the extremities. The last-mentioned method is an excellent one with the calcium chloride injection omitted. The calcium chloride is of doubtful value for the control of hemorrhage, and in addition the turning of the patient to give the injection is an objectionable feature.

Grassman⁵ states that within therapeutic limits morphine is not a cardiac poison. In *cardiac disease* associated with acute respiratory affections morphine must be used cautiously and the same care must

¹ Journal of the American Medical Association, November 5, 1904.

² Lancet, October 1, 1904.

³ Medical Record, September 17, 1904.

⁴ British Medical Journal, December 17, 1904.

⁵ Münchener med. Wochenschrift, 1904, No. 28.

be exercised in acute endocardial and myocardial conditions. It is of great value in *angina pectoris*. Grassman recommends morphine before digitalis in cardiac patients who are nervous and unable to sleep. In advanced heart disease *insomnia* or sleep frequently broken by bad dreams is very common. I have found that small doses of morphine ($\frac{1}{32}$ to $\frac{1}{16}$ grain) given hypodermically will often give the patient several hours of undisturbed sleep. These small doses may be repeated two or three times if necessary.

Pilocarpine. Two years ago this drug was recommended as a remedy for *strychnine poisoning*. Meltzer and Salant¹ made some experimental investigations to determine the accuracy of this claim, and as a result of their work make the following statement: 1. Pilocarpine hydrochlorate does not act as an antidote to strychnine. 2. On the contrary, the addition of pilocarpine apparently supports the poisonous effect of strychnine and by its aid an ineffective subminimum dose may have a toxic or even fatal effect.

Pyoktanin was at one time highly recommended in the treatment of *ulcers, wounds, and malignant growths*. Friend² brings it to notice again. He recommends it in the form of a powder mixed with talcum or starch in the strength of 2 per cent.; as an ointment (10 per cent.) with vaselin or lanolin as a base; as a pencil which, after being dipped in water, may be passed over the surface of an ulcer and in solutions varying in strength from 1:1000.

Quinine. Bäcker³ believes that quinine should receive more attention from obstetricians owing to its oxytocic properties. While it is not always effectual, its use will not infrequently render an instrumental delivery unnecessary. Bäcker gives the quinine in doses of $7\frac{1}{2}$ grains two or three times at short intervals. Not infrequently the first dose has no effect, while the second or third are followed by strong uterine contractions. The same criticism may be made here that was made on the use of ergot—*i. e.*, there are other and safer means of stimulating the uterus.

Hewitt⁴ claims to have obtained good results in the treatment of *exophthalmic goitre* with the sulphate or neutral bromide of quinine. He began with a gelatin-coated pill containing 5 grains of neutral bromide of quinine, morning and evening, and increased the amount to 15 or 20 grains daily.

Ashley-Emile⁵ recommends intramuscular injections of quinine in intractable cases of *malaria*, where quinine cannot be tolerated by

¹ Journal of the American Medical Association, December 31, 1904.

² Illinois Medical Journal, December, 1904.

³ Deutsche med. Wochenschrift, March 16, 1905.

⁴ Medical Times, January, 1905.

⁵ Journal of Tropical Medicine, April 15, 1905.

mouth and in the serious forms of pernicious malaria. He states that he has seen a 5-grain dose intramuscularly reduce the temperature, when 40 to 60 grains by mouth had no effect. The injections are made into the deltoid or interscapular muscles. The hydrochloride of quinine is the salt used.

Economou¹ states that the preliminary administration of *sodium bicarbonate* increases the action of quinine in malaria.

In the treatment of *pneumonia* Galbraith² recommends large doses of quinine. Poole³ has also treated a small series of cases by this method. The routine treatment of pneumonia with a single drug as potassium iodide, digitalis, carbonate of creosote, or quinine is not likely to meet with universal favor. Any drug will probably achieve equally good results in a small number of cases. Probably no disease requires more individualization than pneumonia. Some cases need nothing more than careful nursing, in others the use of a stimulant at the right time will successfully tide over the crisis, while in others the most heroic methods are unavailing.

McGillwray,⁴ in writing on *quinine amblyopia*, states that there are only about 100 cases in the literature. The toxic dose varies from 15 grains to an ounce a day. The condition is more common in women than men and occurs in those with a marked idiosyncrasy or neurotic temperament. It is bilateral and the intensity of the blindness is more marked than in any other form of amblyopia in which recovery is possible.

McGillwray recommends inhalation of nitrite of amyl and digitalis internally in the acute stages.

Salicylates. The intravenous administration of the salicylates as recommended by Mendel was mentioned in last year's review. As employed by Mendel the drug is administered in 4-grain doses at intervals of from twelve hours to three days. Ordinary antiseptic precautions should be taken and the vein should be fully dilated before puncturing. A different vein should be selected each time an injection is made.

Rubens,⁵ in an experience with 60 cases, reports favorably on the method. The effect in *acute articular rheumatism* was most favorable, although the disease was not materially shortened. In *neuralgia* and *muscular rheumatism* the effect was so remarkable that Rubens considers the intravenous use of salicylate of sodium as a specific in these conditions. He also obtained good results in *pleurisy* and *acute laryngitis*.

In the treatment of *multiple arthritis* Santini⁶ has had considerable

¹ Grèce médicale; Journal of the American Medical Association, May 13, 1905.

² Journal of the American Medical Association, January 28, 1905.

³ Ibid., June 3, 1905.

⁴ Scottish Medical and Surgical Journal, November, 1904.

⁵ Deutsche med. Wochenschrift, January, 1905.

⁶ Abstract, Medical Record, October 29, 1904.

success from intra-articular injections of salicylate of soda. In most joints a spot will be found where the capsule is slightly distended and this is the best point for the injection. If the capsule is very much distended some of the fluid may be aspirated before injecting the drug. At the shoulder-joint the injections can only be made about and not into the joint. The drug is given in a 3 per cent. solution of water. From 3 to 5 c.c. are usually sufficient. The pain is usually worse immediately after the injection but quickly subsides; there is also a drop in the temperature. Individual joints may be injected on successive days.

Seibert¹ reports favorably on the rectal administration of large doses of sodium salicylate in the treatment of *cerebrospinal meningitis*. He administers the drug in 15-grain doses every three or six hours. In some instances as much as 750 grains were given during the illness.

The bowel is cleansed by a large watery enema every twelve or twenty-four hours; 15 grains of the sodium salicylate are dissolved in a tablespoonful of warm water and injected into the bowel.

The observations of Klieneberger and Oxenius on the irritating effect of the salicylates on the kidneys was noted in last year's review.

Quenstedt² has also noted that salicylic acid in moderate doses is capable of producing irritation in a short time and that this persists as long as the drug is continued. If the drug is discontinued signs of irritation quickly disappear only to reappear if it is again resorted to. As no permanent bad effect is produced by the salicylates large doses should be used without hesitation whenever they are demanded.

According to Frey³ even these minor irritating effects can be avoided. As the results of experiments on animals and himself he found that the kidneys could be protected perfectly by rendering the urine alkaline. The use of alkali in no way interferes with the action of the salicylates. The most suitable method of using the alkali is in the form of an alkaline water, as it has the additional advantage of promoting diuresis. Frey believes that this method also tends to check the gastric irritation.

Saw Palmetto. Van Zandt⁴ has reported cases illustrating the value of saw palmetto. He has obtained excellent results with this drug in old men suffering from *prostatic troubles*. In this condition Van Zandt gives 1 drachm of the fluid extract of saw palmetto three or four times a day. Under this treatment the general condition of the patients has improved, they have had little annoyance in having to pass their water at night and the use of a catheter could be dispensed with. He obtained equally good results in the treatment of chronic inflammatory conditions

¹ Medical Record, June 17, 1905.

² Therapie der Gegenwart, 1905, No. 3.

³ Münchener med. Wochenschrift, July 11, 1905.

⁴ Medical Record, June 17, 1905.

of the tonsils. Saw palmetto has also been recommended in affections of the mucous membrane of the respiratory tract.

Strychnine. During the past year two communications have appeared as to the affect of strychnine on *blood pressure*. Cabot's¹ observations were made in febrile cases. He measured the blood pressure after the oral or hypodermic administration of strychnine and in order to avoid errors the measurements were taken in many cases before and after the use of the drug. Cabot concludes from this study that in the dosage usually employed strychnine has little influence on the blood pressure as determined by the instruments at present in use.

In an experimental research on the value of strychnine in *shock*, Crile² found that in normal animals when sufficient strychnine was given to cause an increased excitability of the spinal cord, as indicated by an increase in the reflexes and muscular tone, a rise in blood pressure resulted. In forty-eight carefully observed measurements, when smaller doses were employed, no noteworthy change occurred.

The use of the *nitrate of strychnine* in treating *diabetes insipidus* was mentioned in last year's review. Two additional articles have appeared during the past year, one by Stein³ and the other by Leick.⁴ The drug is administered hypodermically, the initial dose being $\frac{1}{16}$ grain. The amount is gradually increased up to $\frac{1}{8}$ grain.

Trional is usually looked upon as being perfectly safe and in therapeutic doses (7 to 30 gr.) incapable of causing untoward effects. A case of *poisoning*, however, has been reported by Moreau.⁵ A dose of 12 grains given for insomnia produced the following symptoms: The morning after the dose was taken the patient complained of a sense of fullness in the head and weakness. That morning the same dose was repeated, and after nine hours' sleep the patient again awoke complaining of headache and weakness. Later there was sweating, nausea, diarrhoea, and roaring in the ears. Strychnine ($\frac{1}{80}$ gr.), three times a day, caused the symptoms to disappear. Moreau considers this a remarkable instance of idiosyncrasy.

Tuberculin. The long-standing prejudice against the use of tuberculin, either as a diagnostic or curative agent, is passing away, although its use, as Baldwin⁶ states, must of necessity be largely limited to institutions. This is necessary because the dosage, intervals between injections, and other symptoms require considerable care and attention. In considering

¹ Boston Medical and Surgical Journal, September 29, 1904.

² New York and Philadelphia Medical Journal, September 24, 1904.

³ Münchener med. Wochenschrift, 1904, No. 36.

⁴ Deutsche med. Wochenschrift, 1904, No. 33.

⁵ Journal des praticiens, 1904, No. 35.

⁶ Journal of the American Medical Association, November 26, 1904.

the use of tuberculin as a curative agent in tuberculosis Baldwin states that there are two possible important ends to be attained. First, "we may succeed in fortifying the patient artificially against the specific poison," and, secondly, "under this stimulus aid in healing an otherwise sluggish tuberculous ulcer."

In using tuberculin for its curative properties Baldwin believes that it is best to give the treatment in several courses if a favorable action is not obtained by the first injections. He states that the reason for this procedure is that during the process of immunization against tuberculin a certain degree of immunity is also obtained against the disease, but after the injections have reached a maximum dose, beyond which there is no local reaction and no increase in the agglutinative power in the blood, it is useless and generally harmful to proceed farther.

In regard to the danger of spreading the disease by the use of tuberculin, Baldwin says that while experimental evidence and the clinical experience of those who have had most opportunity to form unbiased opinions are against this view, nevertheless it must be borne in mind that during a violent local tuberculin reaction the conditions are such as to favor the scattering of tubercle bacilli, because the blood and lymph streams are then much more active about the tubercles.

Baldwin believes that all forms of acute tuberculosis should be excluded from the tuberculin treatment, both on account of the danger of increasing the load for the already poisoned cells and of the possible extension of the disease, either from the increased inflammation or from decreased resistance.

Patients with advanced lesions complicated with other infections, renal or intestinal disease, as a rule, also have overburdened cells, and for this reason are not suitable for the tuberculin treatment. This does not hold true, however, in certain chronic cases with good nutrition.

Cases most suitable for the tuberculin treatment, in Baldwin's opinion, are those with a limited lesion in which the ordinary hygienic-dietetic plan has failed to produce a scar and there is danger of the disease assuming a chronic type. In these cases, which he terms as arrested or incompleated cases, the physical signs do not indicate extensive ulceration, and yet they continue to have expectoration with bacilli as the only symptom. It is of great importance to obtain a healing of the ulcer, and Baldwin believes that statistics show that more persons may be healed by the use of tuberculin than without its aid.

T. W. Brown¹ reports a case of *tuberculosis of the bladder* which was successfully treated by the use of tuberculin.

Some interesting experimental studies on tuberculin by Trudeau,

¹ British Medical Journal, May 20, 1905.

Baldwin, and Kinghorn have been published in the *Journal of Medical Research* for August, 1904.

In this connection may be mentioned a paper by Sawyer¹ on the treatment of tuberculosis with the *watery extract of tubercle bacilli*. In 14 cases in which he was able to give the extract a thorough trial he obtained a satisfactory recovery in all of them. He states that there were no undesirable complications or untoward results from the use of the watery extract.

Urotropin. The use of urotropin in *scarlet fever* for the prevention of *nephritis* was mentioned in PROGRESSIVE MEDICINE last year (December, 1904, p. 360). The favorable report of Widowitz is confirmed by Buttersack,² who ascribes its favorable action to the liberation of nascent formaldehyde in the glomeruli and tubules, thus neutralizing the toxins or destroying the bacteria at the points where the trouble starts.

Buttersack advises a dosage of from $\frac{1}{4}$ to $7\frac{1}{2}$ grains three times daily. There need be no fear of untoward affects. When not used as a preventive throughout the attack the drug should be started with the first appearance of albumin.

Veronal. This new hypnotic was very favorably commented on last year. Burnet³ also recommends the drug and in common with previous observers noted no ill results from its use. He obtained good results in a variety of conditions needing a sedative, such as pneumonia, senile pruritus, insomnia, neuralgia, and neurasthenia.

Being a new drug it is but natural that veronal should be added to the already long list of remedies used in the treatment of *whooping-cough*. Fraenkel⁴ has used it in 28 cases of this disease with remarkably good results, a fact which is unfortunately claimed for most remedies tried in this disease. He administers the veronal in $\frac{1}{2}$ -grain doses three or four times daily in very young children; older children were given 1 to $1\frac{1}{2}$ grains three or four times daily. No ill effects were noted nor was the sleep-producing action of the drug sufficient to cause its disuse.

According to Fraenkel the spasm disappeared in a few days.

Kress⁵ sounds a note of warning in regard to veronal. In an experience with 12 cases in which the drug was administered in $7\frac{1}{2}$ -grain doses he noted a marked cumulative action in several instances. The individuals so affected slept for several days, took hardly any food and were unfit to leave their beds. This observation is important, as the dose used by Kress ($7\frac{1}{2}$ grains) is far below the maximum dose recommended last year (4 to 12 grains, Poly).

¹ Therapeutic Gazette, June, 1905.

² Deutsche Archiv f. klin. Medizin, 1905, Nos. 3 and 4.

³ Journal of Nervous and Mental Diseases, December, 1904.

⁴ Deutsche med. Wochenschrift, 1905, No. 6.

⁵ Therapeutische Monatshefte, 1905, No. 1.

Very large doses of the drug produce deep sleep, weak respirations, slow, weak pulse, and delirium. Various rashes may also occur as the result of excessive dosage. Clarke¹ has reported a case of veronal poisoning and Gerhartz (quoted by Clarke) has had a similar case.

Yeast.² The use of brewers' yeast in the treatment of *pyogenic infections*, such as *acne*, *furunculosis*, *malignant pustules*, etc., has long been known. Its mode of action is as yet but little understood. The clinical fact, however, has been endorsed by animal experiments which show that in many of the mild forms of pyogenic infection that the administration of yeast has a favorable action. Inasmuch as the remedy is simple and perfectly harmless, it can safely be recommended.

Internally it may be given in doses of a teaspoonful to a dessertspoonful dissolved in a glass of water, taken three times a day at the beginning of or during each meal. Fresh brewers' yeast is the form usually employed, although bakers' yeast has been employed.

Recently a number of observers have recommended yeast in the treatment of *gonorrhæal conditions in women*. Among those who have written on the subject are Czerwenka,³ Cronberck,⁴ and Schiller.⁵ Schiller cleanses the vagina with sterile water and then introduces two teaspoonfuls of fresh brewers' yeast and one teaspoonful of grape-sugar, so that the walls of the vagina are coated with it. A vaginal douche should be used in from eight to twelve hours, which removes the yeast used. The yeast is again used in forty-eight hours. The treatment is applicable in cases of acute and chronic gonorrhœa of the vagina and cervix and to a less degree in cases of *purulent vaginitis* and *endocervicitis* due to other causes.

Huggard and Marland⁶ have treated 36 cases of *tuberculosis* with yeast. They state that some improvement was noted in nearly every case in which the yeast had been taken for a month. Huggard and Marland found that yeast seemed to produce an immediate and quite marked increase in the number of leukocytes, but that this was followed by a decrease, and that after some fluctuation there were fewer cells than when the yeast was begun. The daily amount taken was about the size of a walnut. It is best given in cold or tepid milk or in water.

In commenting on the above paper Ullman⁷ points out that he had previously (1901) called attention to the value of large doses of brewers' yeast in the treatment of tuberculosis. Since writing this paper he has

¹ Lancet, 1904.

² Editorial, Journal of the American Medical Association, 1905.

³ Wiener klin. Wochenschrift, December 1, 1904.

⁴ Centralblatt f. Gynäkologie, 1904, No. 44.

⁵ American Journal of Obstetrics and Diseases of Women and Children, May, 1905.

⁶ Lancet, June 3, 1905.

⁷ Journal of the American Medical Association, 1905, p. 207.

continued to use yeast with the greatest benefit to his tuberculous patients. He recommends that the yeast be given in doses of from two to three ounces three times daily.

The cure of a single case of *Addison's disease* by yeast is recorded by Dumas.¹

Mandelstedt² finds that compressed yeast is serviceable in reducing the thirst and glycosuria of *diabetes*.

Kempf³ has treated six cases of *sepsis* and *gangrene* with yeast poultices. The poultice is prepared by taking one quart of brewers' yeast and one pint of *finely sifted cornmeal*. These are mixed and placed near a fire until rising occurs, when about 2 ounces of finely powdered charcoal are mixed with the fine raised dough. The dough is smeared on a thick cloth and applied directly to the affected part. The poultice should be reapplied every twenty-four hours. Kempf found the treatment efficient for *gangrene*, *eczema*, *ulcers*, etc.

¹ *Revue française de méd. et de chir.*, February 6, 1905; abstract, *New York Medical Journal*, March 25, 1905.

² *Vratchebnaya Gazette*; abstract, *Journal of the American Medical Association*, September 17, 1904.

³ *Indiana Medical Journal*, August, 1904.

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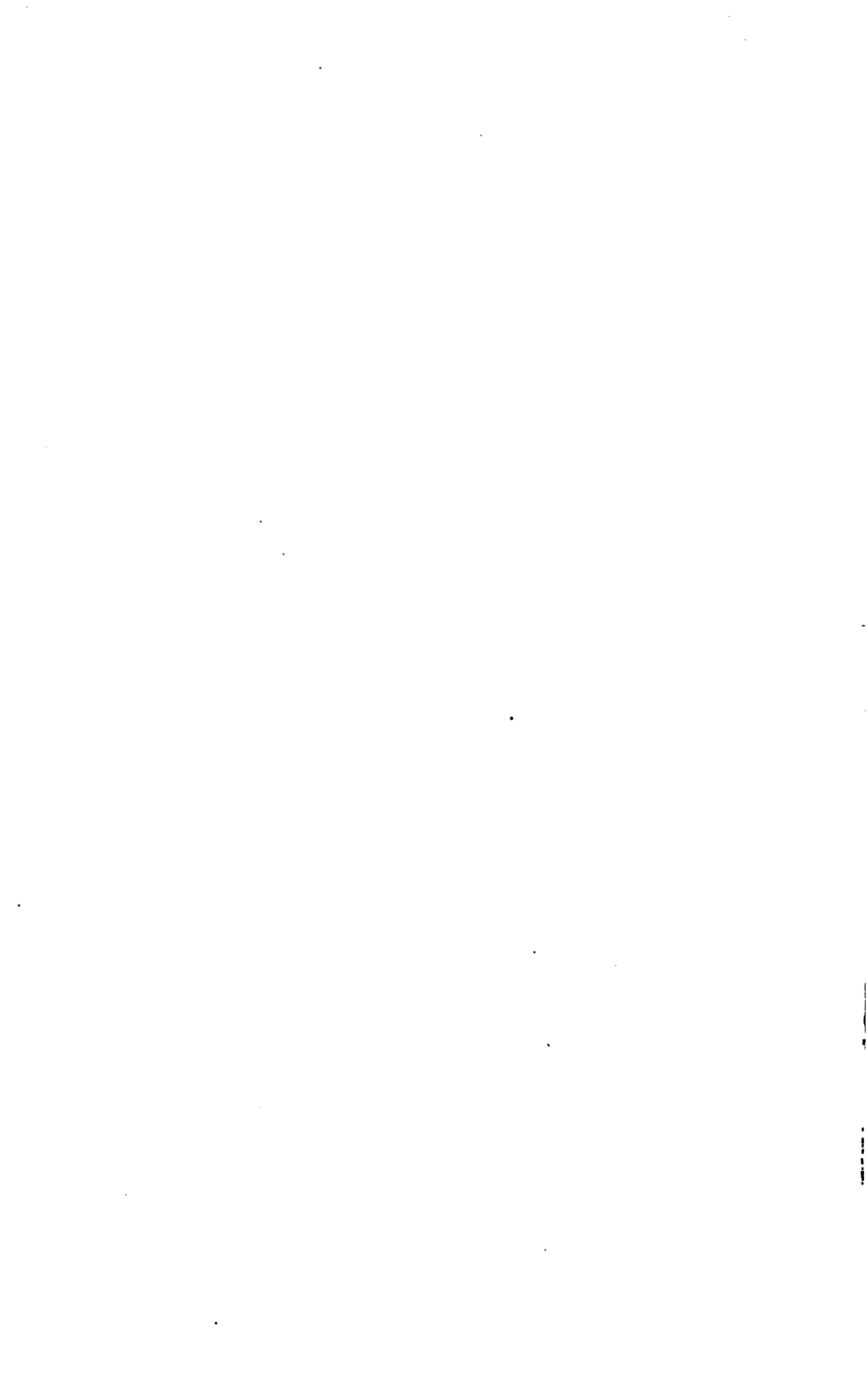
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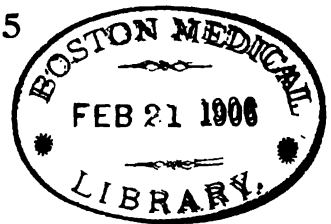
Professor of Therapeutics and Materia Medica in the Jefferson Medical College, Philadelphia

ASSISTED BY

H. R. M. LANDIS, M.D.

Assistant Physician to the Out-Patient Medical Department of the Jefferson Medical
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